Food Technology Abstracts

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GENERAL

2292 KAPUR (OP) and NAGARAJA (KV). Role of regulatory analysis in quality control of processed food products. *Indian Food Packer.* 35(2); 1981; 62-9

Aspects covered include: metallic contaminants in foods, acidity and total soluble solids, low net weight/net volume, preservatives, pineapple slices, canned mango slices, pickles and chutney, canned fruits and vegetables, synthetic syrups, squashes, beverages, vinegars, tomato ketchup and sauces, jams, jellies, marmalades and cheeses and preserves. BSN

2293 SIEHR (W). Testing of materials. *Chemie-Ingenieur-Technik.* 51(12); 1979; 1213-5

2294 BERNHARDT (W), MENRAD (H) and KONIG (A). Ethanol from biomass as a future fuel for automobiles. *Starch.* 31(8); 1979; 254-9 (German)

2295 CLANCY (R). Management in flour, grain and feed. Part 1. *Mill. Feed. Fertil.* 163(5); 1980; 26-7

2296 CLANCY (R). Management in flour, grain and feed. Part 2. Linear programming. *Mill. Feed. Fertil.* 163(6); 1980; 39-40

2297 ANON. Bulk transport. *Mill. Feed. Fertil.* 163(5); 1980; 28-31

FOOD PROCESSING AND PACKAGING

PROCESSING

2298 REUTER (H). Micro-wave technology in food processing. *Gordian.* 80(3); 1980; 44-50 (German)

The author has first given the theoretical background of dielectric (popularly known as "micro-wave") heating, which employs an alternating electrical field of frequency 3kH$_z$ to 3MH$_z$ (wavelength 0.1-100 m). Some industrial applications, especially the thawing of frozen foods, heat preservation, baking and drying, and the economics of the process have been discussed. KMD

2299 SIMON (EJ). Possibilities in the processing technology of instant products. Development and prospects. *Gordian.* 80(3); 1980; 37-42 (German)

Instant products, like ready-to-serve foods, should enable the customer to fulfil his wishes quickly and conveniently. They include, mainly, products that have been stabilized and concentrated by removal of water, and which can be reconstituted to beverages, soups, creams, etc. by the addition of water. A characterization of typical instant products has been attempted, and trends in development indicated. KMD

PACKAGING

2300 LUFT (G). Low-density polyethylene. *Chemie-Ingenieur-Technik.* 51(10); 1979; 960-9

2301 GOWRAMMA (RV), MAHADEVIAH (M), NARESH (R), DWARAKANATH (CT) and ANANDASWAMY (B). Preliminary studies on suitability of flexible packaging materials for packing processed food products. *Indian Food Packer.* 35(2); 1981; 55-61

Suitability of plastic pouches prepared from a laminate of polyester/polyethylene for packaging of (i) mango juice, and pouches of (a) low density polyethylene, (b) polycell, (c) polycoated paper, (d) laminate of paper/Al foil LD/PE, and Al, and (e) Al collapsible tube for (ii) mango jam and (iii) tomato ketchup for storage at room temperature (25-28 C) and at 37 C were investigated. Data on physico-chemical parameters (total carotenoids ascorbic acid, reducing sugar), microbiological analysis (processing time, total bacterial count, total coliform count, total yeast count, total mould count) and organoleptic characteristics (colour, taste, flavour and acceptability) revealed that for packing (i) the polyester/polyethylene two ply pouches were not suitable. However, for (ii) and (iii), (d) and (e) were found to be suitable packaging materials for preservation for 6 months at 25-28 C and 37 C. BSN

2302 CHAKRAVORTY (SC) and GHOSH (B). Role of nitrates in the corrosion of tin plat processed food cans. A review. *Indian Food Packer.* 35(2); 1981; 70-5

Review covers: nitrate as detinner, mechanism of nitrate-induced detinning factors affecting nitrate-induced detinning and control of nitrate-induced detinning. BSN

FOOD ENGINEERING AND EQUIPMENT

2303 SCHLACHTER (H). Safe chemical plants. A constant challenge to technology. *Chemie-Ingenieur-Technik.* 51(10); 1979; 913-20 (German)

2304 LIN (SH). Continuous sterilization of non-Newtonian liquid foods in a tubular sterilizer. *Food Sci. + Technol.* 13(3); 1980; 138-41

The length of a sterilizer which handles non-Newtonian liquid food product has been calculated by using a residence time distribution function that has be developed in this paper, and the thermal inactivation kinetics of micro-organis adopted from a previous paper. The length of the sterilizer generally depends four physical parameters, viz: the pseudoplastic index of the food products, th pH value, the operating temperature, and the sterility requirement. All these four parameters have a significant influence on sterilizer performance and none of them can be neglected. The general applications have been illustrated by simulating the inactivation of *C. botulinum* in several food products. KMD

2305 PUHAR (E). Fermenter systems and ancillary equipment. *Chemie-Ingenieur. Tech* 51(12); 1979; 1222-7 (German)

2306 MERCHUK (JC), STEIN (Y) and MATELES (RI). Distributed parameter model of an airlift fermenter. *Biotechnol. Bioeng.* 22(6); 1980; 1189-211

2307 FLICKINGER (MC), JANSEN (NB) and FORREST (EH). Mobile self-contained off-gas analysis units for fermentation pilot plants. *Biotechnol. Bioeng.* 22(6); 1980 1273-6

2308 POGGEMANN (R), STEIFF (A) and WEINSPACH (P-M). Heat transfer in agitated vess ls with single-phase liquids. *Chemie-Ingenieur-Technik.* 51(10); 1979; 948-59 (German)

FOOD CHEMISTRY AND ANALYSIS

2309 LANGE (R), SCHLIEMANN (J), FRIEBE (R) and LINOW (F). On the use of the Kjeldahl wet digestion and Berthelot reaction combined method for determining nitrogen in biological materials. Part III. Studies on the consecutive and secondary reactions of the indophenol reaction. I. The formation of chlorphenols. *Nahrung*. 24(4/5); 1980; 447-53 (German)

The types and amounts of chlorophenols formed during the Berthelot reaction are described. The chlorination of phenol by means of chloramine T leads via the 2-chlorophenol-2, 4 dichlorophenol pathway to 2,4,6-trichlorophenol, independently of the concentrations of the reactants and of the pH values: tetra- and pentachlorophenols as well as oxidation products of the chlorophenols formed were not detected. These results are in agreement with findings from the chlorination of phenol with hypochlorite in aqueous media. AA

2310 LUDWIG (E). Studies on the Maillard reaction between β-lactoglobulin and lactose. Part IV. The spectra and amino acid composition of the macromolecular reaction products. *Nahrung*. 24(4/5); 1980; 399-404 (German)

The ultraviolet spectra of the macromolecular reaction products are similar to that of β-lactoglobulin. The increased absorption of MR I and MR II at 280 nm is attributed to changes in sugar components during Maillard reaction. In IR spectrum all MR (macromolecular reaction products) show a band at 10.82 cm^{-1}, lying within a range, typical of carbohydrates. Differences between various oscillation ranges of the infrared spectra of the MR products I and II are obviously a manifestation of the dissimilarity between the sequences of reactions occurring in the formation of these products. The amino acid chromatograms confirm that the varying degradation of lysine in the MR depends on the course of the Maillard reaction. A ninhydrin positive substance between leucine and tyrosine is eluated in the chromatogram of MR II. KMD

2311 HIRVI (T), HONKANEN (E) and PYYSALO (T). Stability of 2,5-dimethyl-4-hydroxy-3 (2H) furanone and 2,5-dimethyl-4-methyoxy-3(2H) furanone in aqueous buffer solutions. *Food Sci. + Technol.* 13(6); 1980; 324-5

2312 SCOVILLE (E) and PELEG (M). Evaluation of the effects of liquid bridges on the bulk properties of model powders. *J. Food Sci.* 46(1); 1981; 174-7

Uniform size glass beads admixed with measured amounts of water were prepared as model food powders with controlled interparticle liquid films. These were tested for loose bulk density, compressibility, irrecoverable work in compaction, cohesion and residual modulus after relaxation. The interparticle liquid films in model powders serving as liquid bridges had considerable effect on these bulk characteristics but the effect decreased with increased particle size. The film viscosity and surface tension had comparatively less effect on bulk properties. The possible implications of these findings in real powders are evaluated. MVG

2313 BANERJEE (TS) and GUHA (KC). Detection and estimation of total catechin from Katha by thin layer chromatography. *J. Food Sci. Technol.* (India). 18(1); 1981; 10-1

A simple and accurate TLC method has been developed for determining total catechin in Katha (extract of heart wood (*Acacia catechu*) used for colouring edible arecanut or *Areca catechu*). Catechin is extracted by methanol: acetone: ether: carbondisulphide (1:1:1:1) and identified on TLC plate. It is scraped and eluted by acetone and determined spectrophotometrically at 515 nm by developing colour with the chromogenic reagent fast blue salt B. KAR

2314 LEWIS (MJ) and WILLIAMS (AA). Potential artefacts from using porous polymers for collecting aroma components. *J. Sci. Food Agric.* 31(10); 1980; 1017-26

Examination of the components produced by heating Porapak Q and Tenax GC above their normal operating temperatures revealed the presence of hydrocarbons, benzaldehyde, ethylbenzaldehyde, acetophenone, ethylacetophenone, isopropylbenzyl alcohols, diacetylbenzene, phenol and furans, all of which could potentially occur as artefacts when using these porous polymers for collecting and concentrating aroma components from foods. AA

2315 MUNETA (P). Analytical errors resulting from nitrate contamination of filter paper. *J. Assoc. Off. Anal. Chem.* 63(4); 1980; 937-8

Certain brands and grades of filter paper can contribute significant errors up to 20-30 ppm nitrate nitrogen in the nitrate analysis of cured meats. Filter paper for qualitative filtration contained the largest quantity of nitrate. The brand of filter paper determined the nitrate extracted from the filter paper. Low ash or ashless quantitative filter paper contained no nitrate, except 1 box from which a very small quantity of nitrate was extracted. AA

2316 FRITZ (W) and UHDE (WJ). Contribution to the determination of volatile nitrosamines in foods of animal origin. *Nahrung.* 24(4/5); 1980; 471-7 (German)

A method is described for the fluorescence-spectrophotometric-densitometric determination of nitrosamines. For this purpose, foods of animal origin are vacuum-distilled, the distilled-over nitrosamines are extracted with methylene chloride from an acid medium; and, after cleavage by hydrogen bromide, the corresponding amines are reacted with 7-chloro-4-nitrobenzo-2-oxa-1, 3-diazole. The purification of the extract and the resolution of the corresponding fluorescent amine derivatives are affected simultaneously by two dimensional thin layer chromatography. The determination is achieved by *in situ* fluorescence spectrophotometry against test substances on the same slab. This method seems useful for investigations into the formation of nitrosamines in foods of animal origin, because it permits detection of nitrosamine concentrations as low as 0.1µg/kg in food. AA

FOOD MICROBIOLOGY

2317 BARON (A), ROMBOUTS (F), DRILLEAU (JF) and PILNIK (W). Purification and properties of the pectinesterase produced by *Aspergillus niger*. *Food Sci. + Technol.* 13(6); 1980; 330-3

Pectinesterase is extracted from a culture medium of *Aspergillus niger*. A 134-fold purification of the enzyme with a yield of 33.8% is achieved by successive chromatographies on columns of DEAE-Sephadex A 50, DEAE-Biogel A, SP-Sephadex C50 and Sephacryl-S 200. Maximum enzyme activity is observed at pH 4.5 and at 40 C; the Km value (3 g/e) and the V_{max} value (1,7 µmol/min/UPE) are constants, independent of the NaCl concentration. Pectin prepared by demethylation with the enzyme is still homogenous in DEAE-cellulose chromatography; a "multichain" mode of attack of this enzyme is hypothesized. AA

2318 GREEN (BL) and LITSKY (W). Evaluation of millipore cartridge-type water treatment systems for microbiological applications. *J. Food Prot.* 42(8); 1979; 654-5

Two different cartridge-type water treatment systems were evaluated for use in the microbiology laboratory, employing the distilled water suitability test (DWST). The Milli-Q system fed by distilled water and the Milli-R/Q system fed by tap water both produced water acceptable for microbiological use as measured by the DWST. Concentrations of ionic species (as measured by conductivity) in Milli-Q and Milli-R/Q products were significantly lower than in the double distilled control water. AA

YEAST

2319 MOULIN (G), GUILLAUME (M) and GALZY (P). Alcohol production by yeast in whey ultrafiltrate. *Biotechnol. Bioeng.* 22(6); 1980; 1277-81

FUNGI

2320 SHARMA (OP) and SHARMA (KD). Utilization of fat liquors by fungi. *Def. Sci. J.* 30(2); 1980; 93-4

MUSHROOM

2321 ROBITAILLE (HA) and BADENHOP (AF). Mushroom response to postharvest hyperbaric storage. *J. Food Sci.* 46(1); 1981; 249-3

Vessels suitable for storing mushrooms (*Agaricus bisporus* (Lange) at absolute pressures to 35 atm were constructed from 43 liter (IA) gas cylinders and plumbed for conducting static or continuous-flow experiments. Neither pressurization nor gradual depressurization over 6 hour injured mushrooms. Pressure did not affect respiration, but significantly reduced moisture loss during storage. Mushrooms depleted O_2 to very low levels and showed high tolerance to CO_2. Pressure was used to safely increase CO partial pressure (p) 35-fold. At 0.035p, CO reduced mushroom browning but not respiration. A completely autonomous storage system with CO_2 removal and automatic O_2 replenishment was developed. AA

2322 WAHID (M). Effect of gamma irradiation and storage on the catalase and peroxidase activities of mushrooms. *Food Sci. + Technol.* 13(6); 1980; 291-2

Mushrooms were picked with closed caps, irradiated at 0, 1.0 and 2.5 KGy dose and studied for their catalase and peroxidase activities during the storage period of 8 days at 14 ± 2 C. No significant difference was observed in peroxidase activity till 4th day of storage after which it decreased significantly. Catalase activities also decreased during storage. Irradiation had no immediate effects on 0 day, but during further storage all the irradiated samples gave significantly higher values of catalase and peroxidase enzymes. The effects of 1.0 and 2.5 KGy did not differ significantly from one another. AA

2323 VAN ZAAYEN (A-M). Diseases and pests of cultivated mushrooms. Virus disease. *Mushroom J.* No.89; 1980; 165-9

FOOD ADDITIVES

2324 SHAH (LK). Additives in food products. *Indian Food Packer.* 35(2); 1981; 76-8

Aspects covered include: food acids, preservatives, flavours, flavouring agents and flavour boosters, emulsifying and stabilising agents and harmless food colours. BSN

2325 MUERMANN (B). Important changes in the regulations relating to permitted food additives, meat and preparation of drinking water. *Gordian.* 80(1-2); 1980; 8 (German)

2326 DAVIDSON (PM), BREKKE (CJ) and BRANEN (AL). Antimicrobial activity of butylated hydroxyanisole, tertiary butylhydroquinone,and potassium sorbate in combination. *J. Food Sci.* 46(1); 1981; 314-6

Butylated hydroxyanisole (BHA), tertiary butylhydroquinone (TBHQ), and potassium sorbate, alone and in combination, were tested for antimicrobial activity against *Staphylococcus aureus* and *Salmonella typhimurium* in trypticase soy broth. Concentrations of the antimicrobials which resulted in 0-50% growth inhibition of the test organisms after 72 hour at 32 C were used in combination. Sorbate-BHA and sorbate-TBHQ combinations caused a 12 hour delay in growth initiation of *S. aureus*. No delay in growth initiation was found with BHA-sorbate combinations against *S. typhimurium*, but all combinations had synergistic antimicrobial activity against the microorganism. TBHQ showed little or no effect on growth of *S. typhimurium*. AA

2327 SHANKARANARAYANA (ML), ABRAHAM (KO), RAGHAVAN (B), SHANKARACHARYA (NB) and NATARAJAN (CP). Trends in flavour regulation. *Indian Food Packer.* 35(2); 1981; 106-11

Aspects covered include: use of flavourings for various purposes, safety-in-use, systems of legislation, enforcement and labelling. BSN

2328 SANTHANAKRISHNAN (TS). Food colours and their future. *Indian Food Packer.* 35(2); 1981; 79-96

Aspects covered include: historical development, synthetic food colours, physico-chemical characteristics, toxicological aspects, natural colours, physico-chemical characteristics, new food colours, poly dye colour and the probable future developments. BSN

2329 SAMPATHU (SR), KRISHNAMURTHY (N), SHIVASHANKAR (S), SHANKARANARAYAN (R), SRINIVASA RAO (PN) and LEWIS (YS). Natural food colours. *Indian Food Packer.* 35(2); 1981; 97-105

A brief account of the development, process details and food applications of natural food colours like, nature-identical synthetics, annatto, turmeric, red beet, safflower, paprika, grapes and kokam, and regulatory status of natural colourants have been covered. BSN

2330 SAPERS (GM), TAFFER (I) and ROSS (LR). Functional properties of a food colourant prepared from red cabbage. *J. Food Sci.* 46(1); 1981; 105-9

Spectral, colourant and stability properties of colourants based on red cabbage, grape, cranberry, beet and Red No. 40 were compared in buffer and in a simulated beverage. At pH 3, red cabbage imparted a red colour similar to that of beet juice and less orange than that of the other colourants. Increasing the pH of red cabbage extracts to 4 produced a bathochromic shift and decreased colour strength. Tristimulus parameters displayed maxima when L was varied. Red cabbage pigments were more stable during heating and storage than were the other colourants tested. pH had little effect on colour stability; exposure to light greatly increased colour loss during storage. AA

2331 FRATZ (DD). Automated determination of salts in water-soluble certifiable colour additives by ion chromatography. *J. Assoc. Off. Anal. Chem.* 63(4); 1980; 882-8

A previously developed ion chromatographic method for the determination of salts in water-soluble certifiable colour additives was automated, using a Model 12 Dionex ion chromatograph equipped with a program controller and programmable computing integrator. Programs were written for the program controller for continuous automated analysis of up to 50 samples in about 20 hour with periodic regeneration of the suppressor column and automatic shut-down. All data were processed through the integrator, programmed to give results in weight/weight percent. Recoveries were performed on 4 anions: chloride, phosphate, bromide,

and sulfate. Twentyfive colour additives could be analyzed by the method. Standard deviations in the determinations ranged from 0.01 to 0.16 at addition levels of 0.20-9.45% with 6 replications. Recoveries for addition levels of 0.2-5.0% with 2 replications fell within the range of 84.0-105.0%. Approximate lower limits of detection for each anion were as follows : chloride, 0.07%; phosphate, 0.10%; bromide, 0.06%; sulfate, 0.07%. AA

2332 SODEMANN (K). Mannitol as a sugar substitute. *Ernahrungsforschung*. 24(3); 1979; 69-70 (German)

CEREALS

RICE

2333 CORNELIUS (JA). Rice bran oil for edible purposes. A review. *Trop. Sci.* 22(1); 1980; 1-26

This paper describes the problem of producing rice bran oil suitable for edible purposes and discusses methods for overcoming the problem with particular reference to bran stabilisation by heat and controlled moisture content. It also considers the characteristics of the crude oil and processing operations involved in producing fully refined edible oil including salad oil, cooking oil, margarine and shortenings. Some nutritional aspects of rice bran oil are discussed. AA

2334 EL-SAIED (HM), AHMED (EA), ROUSHDI (M) and EL-ATTAR (W). Gelatinization, pasting characteristics and cooking behaviour of Egyptian rice varieties in relation to amylose and protein contents. *Starch*. 31(8); 1979; 270-4

Gelatinization and pasting characteristics of milled powder of short grain rice varieties gave amylograms which generally exhibited lower gelatinization temperatures and longer gelatinization times than long grain varieties. Gelatinization temperatures and peak viscosities were independent of amylose and protein contents; the drop in viscosity at 94 C generally was negatively correlated with protein content but positively correlated with amylose content. The maximum volume expansion ratio and water absorption ratio for short grain varieties were lower than with the long grain varieties, and the two ratios were also related to the amylose content. Apparently cooking period was the principle factor for controlling the degree of cooking. AA

WHEAT

2335 WOOTTON (M) and BAMUNUARACHCHI (A). Application of differential scanning calorimetry to starch gelatinization. II. Effect of heating rate and moisture level. *Starch*. 31(8); 1979; 262-4

The influence of heating rate on the gelatinization of wheat starch and starch/water ratio on the gelatinization of wheat, maize, waxy maize and amylomaize starches was examined. More rapid heating resulted in a lowering of the onset temperature of gelatinization for wheat starch from 52 C to 8 C per minute to 46 C at 32 C per minute. A linear relationship was observed between moisture content and gelatinization energy for starch /water ratios between 1:2 and 2:1. This allowed calculation of the minimum level of water, necessary to initiate gelatinization of each starch. These levels were in excess of the water binding capacity for each starch and were 0.45, 0.45, 0.47 and 0.52 g water/g of wheat, maize, waxy maize and amylomaize starches respectively. AA

2336 BARNES (PJ) and TAYLOR (PW). The composition of acyl lipids and tocopherols in wheat germ oils from various sources. *J. Sci. Food Agric.* 31(10); 1980; 997-1006

It was observed that the quality and composition of commercial wheat germ oil is variable and that methods of assessing quality and detecting adulteration are essential. HPLC with fluorescence detection is well suited to the analysis of tocopherols, tocotrienols and tocophenol acetate in wheat germ oil. KAR

2337 NICOLAS (J), GUSTAFSSON (S) and DRAPRON (R). Effects of some parameters on the kinetics of ascorbic acid destruction and dehydro ascorbic acid formation in wheat flour doughs. *Food Sci. + Technol.* 13(6); 1980; 308-13

2338 HARIDAS RAO (P), KUMAR (GV), RANGA RAO (GCP) and SHURPALEKAR (SR). Studies on stabilisation of wheat germ. *Food Sci. + Technol.* 13(6); 1980; 302-7

Among the different processing methods tried for stabilisation of wheat germ, toasting of germ for 25 minutes at 150 C in an air circulation oven or for 5 minutes to a temperature of 130 C in a coffee roaster, resulted in a product of improved acceptability and having a residual lipase activity of 76.4 and 45.9% respectively. Steaming of a 5 cm thick layer of germ spread on a wire mesh bottom tray, for 10 minutes at atmospheric pressure totally inactivated lipase, lipoxidase and proteolytic enzymes in the product, which though acceptable, had a somewhat cooked taste. Drum drying of slurry containing 33% ground unprocessed (raw) germ at a steam pressure of 35 psi resulted in a highly acceptable and ready-to-eat product, wherein all the three enzymes were completely inactivated. Defatting of germ with n-hexane did not affect the enzyme activity, but resulted in a product with taste inferior to that of unprocessed germ. When packed in HDPE pouches, unprocessed germ turned unacceptable within two weeks of storage, while defatting of germ improved the shelf-life to 12 weeks. Drum drying extended the shelf life to 20 weeks, whereas toasting or steaming increased it further to 26 weeks. Packing in HDPE or polycel pouches or hermetically sealed cans followed a similar pattern. AA

2339 FRANCIS (BJ) and ADAMS (JM). Loss of dry matter and nutritive value in experimentally-infested wheat. *Trop. Sci.* 22(1); 1980; 55-68

Samples of wheat were infested in the laboratory with adult *Sitophilus Oryzae* (L.) and stored at 27 C and 70 per cent RH for 14 weeks. The dry matter weight loss, damage, number of emerged insects and weight of frass were recorded weekly. Samples were removed for proximate analysis, determination of amino acid composition and uric acid levels. The results indicated an overall dry matter loss of up to 38 per cent. Of the original starch content, about 43 per cent was lost and there was an 18 per cent loss of the original protein fraction. The chemical analyses employed in this investigation confirmed that standard analytical techniques used for estimating macronutrient fractions were useful in monitoring nutritive changes in wheat resulting from infestation by *Sitophilus oryzae*. AA

MILLETS

2340 FEIG (S) and STERSKY (AK). Characterization of a heat-resistant strain of *Bacillus coagulans* isolated from cream style canned corn. *J. Food Sci.* 46(1); 1981; 135-7

The strain grown at 45 C on Mn^{++} supplemented nutrient agar was highly heat resistant as indicated below : in phosphate buffer, D_{100} = 86.00, D_{105} = 27.5, D_{110} = 6.1 min. and Z = 8.6 C; in cream style corn extract, D_{110} = 9 min. The spores grown at 50 and 55 C had the D_{110} values in buffer of 2.5 and

1.8 min. respectively. MVG

2341 TONGNUAL (P), NANSON (NJ) and FIELDS (ML). Effect of proteolytic bacteria in the natural fermentation of corn to increase its nutritive value. *J. Food Sci.* 46(1); 1981; 100-4, 109

Costa Rican, corn meal was fermented with tap water of pH 7.2 and pH 5.3. No significant differences were found in % relative nutritive value (RNV), lysine or tryptophan levels between the two pH. The fermented values, however, were significantly higher ($p < 0.05$) than unfermented ones. During the first 48 hours, most increase in RNV occurred. During typical fermentation, free essential amino acids increased and amino acid balance changed. There was a decrease in proteolytic bacteria after 3 days of fermentation and decline by few cells per ml by the 4th day. Proteolysis decreased by the 2nd day of natural lactic fermentation. MVG

SORGHUM

2342 WU (YV) and STRINGFELLOW (AC). Protein concentrate from air classification of flour and horny endosperm from high-lysine sorghum. *J. Food Sci.* 46(1); 1981; 304-5

Flour and shorts from a high-lysine sorghum were finely ground and air classified. The protein contents of the original flour and horny endosperm were 9.9 and 18.6% respectively, and the protein contents of the combined high-protein fractions after air classification were 18.6 and 23.6%. These fractions accounted for 18 and 15% of the flour and horny endosperm weights and for 31 and 19% of the total protein. Protein shifts were 39% for flour and 23% for horny endosperm. AA

2343 SHOTWELL (OL), BENNETT (GA), GOULDEN (ML), PLATTNER (RD) and HESSELTINE (CW). Survey for zearalenone, aflatoxin and ochratoxin in U.S. grain sorghum from 1975 and 1976 crops. *J. Assoc. Off. Anal. Chem.* 63(4); 1980; 922-6

Grain sorghum samples (197) from 10 States harvested in 1975 and 1976 were analyzed for zearalenone, aflatoxin, and ochratoxin by the Eppley procedure. Zearalenone was detected in 56 samples (28%) at levels of 200-6900 ng/g (the detection limit was 100-200 ng/g). Zearalenone identity was confirmed in representative samples by gas chromatography-mass spectroscopy of the trimethylsilyl derivatives. No ochratoxin was detected in any sample (the detection limit was about 50 ng/g). Aflatoxin was detected in 4 samples at level of 54, 6, 10 and 7 ng total aflatoxin/g (the detection limit was ca 3 ng/g). The identity of aflatoxin B_1 in the samples was confirmed by formation of the water adduct on thin layer chromatographic plates. AA

BARLEY

2344 SLOMINSKI (BA). Phenolic acids in the meal of developing and stored barley seeds. *J. Sci. Food Agric.* 31(10); 1980; 1007-10

In the ripe seeds or seeds stored for 2-6 weeks after harvesting, the content of free and soluble bound phenolic acids was distinctly lower. No free caffeic or chlorogenic acids were detected in the seeds by the procedure applied. KAR

PULSES

2345 COLONNA (P), BULEON (A) and MERCIER (C). *Pisum sativum* and *Vicia faba* carbohydrates : Structural studies of starches. *J. Food Sci.* 46(1); 1981; 88-93

The granular structure and fine structure of the amylose and amylopectin components of the above beans has been studied with special emphasis on pointing out the differences between legume starches and cereal or tuber starches. The fine structure was studied by pullulanase debranching before or after beta amylolysis and by properties of the chemically fractionated amylose and amylopectin. The granular structure was studied by X-ray diffractometry and linterization. It was demonstrated that starches of both the beans were similar, while they had a higher amylose content than normal cereal or tuber starches, their fine structure and properties of amylose and amylopectin were very similar to those of cereal starches. Their crystalline structure, however, was intermediate between the cereal and tuber starches. MVG

2346 GUEGUEN (J). Solubility of faba bean (*Vicia faba* L.) and pea (*Pisum sativum* L.) protein in salt solutions. *Food Sci. + Technol.* 13(3); 1980; 156-63 (French)

PEA

2347 VISSCHER (GJW) and SCHURER (K). An appraisal of the texture test system as a standard for pea tenderness. (An evaluation of eight years of calibration work in the Netherlands). *Food Sci. + Technol.* 13(3); 1980; 142-4

COLOSSUS PEA

2348 CHUNG (SY), MORR (CV) and JEN (JJ). Effect of microwave and conventional cooking on the nutritive value of colossus peas (*Vigna uniguiculata*). *J. Food Sci.* 46(1); 1981; 272-3

Both the methods did not yield results which reflected significant changes in fat, protein, β-carotene and ascorbic acid contents. With microwave cooking, there was greater loss of several amino acids, but greater retention of thiamin and riboflavin than conventional cooking. No significant differences between the cooking methods were observed with mineral losses. Both methods (15-60 minutes cooking) resulted in 92-97% loss of trypsin inhibitor. MVG

COWPEA

2349 ADENIJI (AO) and POTTER (NN). Nutritional and sensory properties of canned and stored moin-moin. *J. Food Sci.* 46(1); 1981; 198-200

Canned moin-moin was studied for nutritional and sensory properties after processing and following storage at 22.2 C and 29.4 C for periods up to 6 months. Comparisons were made with freshly prepared, traditional steamed moin-moin. The canned product remained a very good source of thiamin after thermal processing and storage losses. Chemical assays of lysine, available lysine, methionine, and tryptophan showed no losses of these amino acids from processing or storage, but PER values indicated that thermal processing significantly decreased protein quality of products in rat feeding studies. PER values of canned product then remained stable in storage. After 6 months at both storage temperatures a Nigerian taste panel ranked overall acceptability of the canned product at 6.5 on a 9-point hedonic scale, compared to 7.5 for the freshly prepared traditional moin-moin. AA

RED BEAN

2350 LII (G-Y) and CHANG (SM). Characterization of red bean (*Phaseolus radiatus* var. *Aurea*) starch and its noodle quality. *J. Food Sci.* 46(1); 1981; 78-81

Red bean (*Phaseolus radiatus* var. *aurea*) starch was isolated by a wet-milling process and steeping in 0.1% sodium hydroxide which gave the best starch purity. Physical properties of the starch including granule sizes, gelatinization temperature range, iodine affinity, X-ray diffractogram, swelling and solubility pattern, Brabender amylogram, gel strength and degree of syneresis, were examined. Starch noodles were prepared from red bean starch and compared with those from mung bean. Noodle quality was examined by solid loss during cooking, tensile strength and organoleptic tests. The results indicated that red bean starch noodles gave fairly good quality, although not as good as mung bean starch noodles. AA

GREAT NORTHERN BEAN

2351 SATHE (SK) and SALUNKHE (DK). Functional properties of the Great Northern bean (*Phaseolus vulgaris* L.) : Proteins: emulsion, foaming, viscosity, and gelation properties. *J. Food Sci.* 46(1); 1981; 71-4, 81

Bean flour, albumins, globulins, protein concentrates (PC) and protein isolates (PI) were investigated. PC had highest water and oil absorption capacity (5.93 and 4.12 g/g). They also had highest emulsion capacity (72.6 g oil emulsified/g) while albumins had highest emulsion stability (<5 ml separation of phase in 780 hour at 21 C). The protein had fair foaming ability which was concentration dependent. MVG

2352 SATHE (SK) and SALUNKHE (DK). Solubilization and electrophoretic characterization of the Great Northern bean (*Phaseolus vulgaris* L.) proteins. *J. Food Sci.* 46(1); 1981; 82-7

The solubility and electrophoretic behaviour of dry bean proteins were investigated. The protein contents in bean flour, albumins, globulins, protein concentrates and in protein isolates were 26.10, 81.68, 92.26, 85.44 and 92.43% (dry weight basis) respectively. Extractable albumins and globulins accounted for 21.80 and 73.40% of protein respectively. The protein solubility (as extractable by 2% NaCl) was minimum in pH range 4.2-4.4. The solubility pattern indicated higher solubilization at alkaline pH than at acid pH. Of the solubilizing agents used, Na_2CO_3, (5.0%), K_2SO_4 (5.0%), SDS (5.0%) and NaOH (0.02 N and 1N) were found most effective solubilizing 93.6 g of Lowry protein/100 g of Kjeldahl protein. Dimethyl formamide was the poorest of solubiliser (82.50-92.50 mg of Lowry protein/100 g of Kjeldahl protein). SDS-PAGE electrophoresis, gave a better resolution of protein subunits than PAMU-PAGE system. SDS-PAGE electrophoresis of bean flour, albumins, globulins, protein concentrates and protein isolates contained atleast 22, 14, 10, 14 and 11 subunits with molecular weight range of 14,700-550,000, 1400-460,000, 19,300-450,000, 19,500-432,000 and 19,400-460,000 daltons respectively. The molecular weights of predominant subunits of the above proteins were 294,000, 266,000, 123,000, 146,000 and 135,000 respectively. With isoelectric focusing, the above proteins showed 15, 13, 15, 16 and 11 subunits with apparent isoelectric pH ranges of 6,60-4.95, 6.50-4.87, 6.60-4.85 and 6.58-4.62 respectively. Subunit pattern of individual proteins is discussed. The complexity of the bean proteins was further elucidated by column chromatography. MVG

OILSEEDS AND NUTS

2353 RHEE (KS), ZIPRIN (YA) and RHEE (KC). Antioxidant activity of methanolic extracts of various oilseed protein ingredients. *J. Food Sci.* 46(1); 1981; 75-7

Methanolic extracts of defatted oilseeds (cottonseed, groundnut and soybeans flours, concentrates and isolates were investigated for antioxidant activity (AA). Cottonseed extracts had more AA than those of groundnut and soybean. Total phenolic content was also higher in cottonseed protein. A significant correlation was observed between methanol soluble AA and total phenolic content in defatted flours and concentrates but not in extract of isolates. The methanol soluble AA was indicative of the antioxidant potential of these proteins in cooked meats. MVG

2354 RHEE (KS) and RHEE (KC). Nutritional evaluation of the protein in oilseed products heated with sugars. *J. Food Sci.* 46(1); 1981; 164-8

COTTONSEED

2355 BLOUIN (FA), ZARINS (ZM) and CHERRY (JP). Role of flavonoids in the production of colour in biscuits prepared with wheat and cottonseed flours. *J. Food Sci.* 46(1); 1981; 266-71

Biscuits prepared with 80% wheat and 20% liquid-cyclone-processed and hexane-defatted glandless cottonseed flours were yellow-brown. To isolate and identify pigments responsible for colour, the cottonseed flours were extracted with aqueous isopropyl alcohol. These extracts were fractionated into nonflavonoid and flavonoid components by Sephadex column chromatography. Biscuits containing the extracted cottonseed flours (free of flavonoids) were brown, those prepared with the nonflavonoid fractions were tan, and those to which the flavonoid mixtures were added were yellow. Chromatographic and ultraviolet visible spectral methods showed that there are seven major flavonoids in both flours, tentatively identified as isoquercitrin, rutin, quercetin 3-0-robinoside, quercetin 3-0-neohesperidoside, kaempferol 3-0-neohesperidoside, quercetin 3-0-glucoglucoside, and kaempherol 3-0-glucoglucoside. AA

2356 PONS (WA) Jr., LEE (LS) and STOLOFF (L). Revised method for aflatoxins in cottonseed products and comparison of thin layer and high performance liquid chromatography determinative steps; Collaborative study. *J. Assoc. Off. Anal. Chem.* 63(4); 1980; 899-906

Modifications to save analyst time and reagents have been made in the rapid method for separation and quantitation of aflatoxins in cottonseed products. A collaborative study of the revised method, including optional high performance liquid chromatography (HPLC) in addition to thin layer chromatography for the determinative step, showed no change in the method precision or accuracy due to the modifications and no significant difference in the values obtained by either determinative procedure. The HPLC technique provided no significant difference in analysis repeatability, but did reduce the between-laboratory error component. The method has been adopted as official first action. AA

SOYBEAN

2357 FINKOWSKI (JW) and PELEG (M). Some rheological characteristics of soy extrudates in tension. *J. Food Sci.* 46(1); 1981; 207-11

2358 JOHNSON (LA), DEYOE (CW) and HOOVER (WJ). Yield and quality of soymilk processed by steam influsion cooking. *J. Food Sci.* 46(1); 1981; 239-3, 248

2359 DEL VALLE (FR), VILLANUEVA (H), REYES-GOVEA (J), ESCOBEDO (M), BOURGES (H), PONCE (J) and MUNOZ (MJ). Development, evaluation and industrial production of a powdered soy-oats infant-formula using a low-cost extruder. *J. Food Sci.* 46(1); 1981; 192-7

PEANUT

2360 BHUCHAR (VM), AGRAWAL (AK) and SHARMA (SK). A study of solvent extraction of lipids from whole peanut kernels using all-purpose automatic solvent extractor. *J. Food Sci.* 46(1); 1981; 259-2

Extraction of lipids from whole peanut kernels can be accomplished much faster in an automatic solvent extractor with a lower solvent: seed ratio than by immersion or in a Soxhlet extractor. A possible explanation of the function of moisture in the extraction of lipids from the whole peanut kernels has been put forward. This mode of extraction is expected to produce economically fat-lean kernels, while oil is obtained as a co-product. AA

TUBERS AND VEGETABLES

ONION

2361 GORIN (N) and BORCSOK (S). Chemical composition of stored onions; cultivar hyduro, as a criterion of freshness. *Food Sci. + Technol.* 13(3); 1980; 164-6

Two batches of onions, one treated with maleic hydrazide and the other untreated, were stored at ambient temperature, and analysed for dry matter, ash, total pyruvate, control pyruvate, and soluble sugars (glucose, fructose and sucrose). Onions were called 'fresh' if the batch contained less than 1% of sprouted bulbs. By this definition, the sum of the individual sugars (which varied from 30-39 g/100 g dry matter) is the most appropriate criterion of freshness (i.e. keeping quality). The treated and untreated batches had different patterns of individual sugar; but they did not differ significantly as regards other components. KMD

BEETROOT

2362 SCHWARTZ (SJ), HILDENBRAND (BE) and VON ELBE (JH). Comparison of spectrophotometric and HPLC methods to quantify betacyanins. *J. Food Sci.* 46(1); 1981; 296-7

Quantitative data for betacyanins determined by a spectrophotometric method and a high performance liquid chromatography (HPLC) method were compared. Pigment solutions at pH 4.0, 5.0 and 6.0 were heat treated under a nitrogen atmosphere and analyzed for pigment losses at appropriate intervals. Fresh, blanched and canned beets were measured for pigment content by the two methods. Quantitative determinations of pigment in all purified or undergraded samples compared well when analyzed by either method. Discrepancies between results of the two procedures occurred and increased up to 15% with extended heat treatment of the pigment. The differences were attributed to formation of degradation products or interfering substances. Of the two, the HPLC method is preferred when interfering substances are present. AA

2363 BILYK (A). Thin-layer chromatographic separation of beet pigments. *J. Food S.* 46(1); 1981; 298-9

A new simple method for the thin-layer chromatographic (TLC) separation o betalaines has been developed and is described in this paper. The individual components were separated by preparative TLC on cellulose-coated plates and analyzed by a multiple development TLC technique with solvent mixtures consist of ethanol, isopropanol, water, and acetic acid. Separated components of vari hues were clearly visible after development without application of an indicato Spectral analyses of fractions also were conducted. By this TLC procedure, an lytical data were obtained more rapidly and conveniently than could be obtaine by other methods such as electrophoresis. AA

POTATO

2364 HUANG (DY), SWANSON (BG) and RYAN (CA). Stability of proteinase inhibitors in potato tubers during cooking. *J. Food Sci.* 46(1); 1981; 287-90

Three proteinase inhibitors were monitored during boiling (30 minutes), o baking (80 minutes, 191 C) and microwave baking (7 minutes of potato tuber (Ru Burbank variety) of extracts to assess the effectiveness of cooling on denatur of potentially toxic proteins: (i) a chemotrypsin inhibitor, (ii) a chymotryp- sin and trypsin inhibitor and (iii) carboxypeptidase inhibitor. During cookin by all treatments, (ii) was completely inactivated, while (i) was partially in activated. (iii) was very stable with all the cooking methods. Microwave bak was most effective in inhibition of (i) and (ii). MVG

2365 WILSON (AM), WORK (TM), BUSHWAY (AA) and BUSHWAY (RJ). HPLC determination of fructose, glucose and sucrose in potatoes. *J. Food Sci.* 46(1); 1981; 300-1

A high-performance liquid chromatographic (HPLC) method has been develope to determine fructose, glucose, and sucrose content of potatoes. The HPLC system consisted of a μBondapak/carbohydrate column, a solvent system of aceto nitrile-water (75:25), a flowrate of 1.8 ml/min. and a refractive index detect Analysis, including sample preparation, was complete in 30 minutes. With the exception of high concentrations of sucrose (8 mg/g or above), the method re- covered 93% or more of all sugars. The coefficients of variation for the pro dure ranged from 1.39-13.31%. TLC indicated that there were no interfering co pounds eluting with any of the three sugars. AA

2366 MICA (Von B). Effect of graded N-, P-, K doses and additional doses of Ca a Mg on starch and sugar content of potatoes. *Starch.* 31(8); 1979; 275-8

From 1976 to 1978 experiments with potatoes were carried out and fertili doses N, P and K together with Ca and Mg were added in certain dosages. The cium and magnesium decreased the yield of tubers. The chemical composition the tubers, however, was positively influenced by magnesium in presence of hi N-, P-, K-doses. Optimum conditions for high yields of tubers and starch wer determined. AA

2367 AUGUSTIN (J), BECK (C) and MAROUSEK (GI). Quantitative determination of asc bic acid in potatoes and potato products by high performance liquid chromatog phy. *J. Food Sci.* 46(1); 1981; 312-6

A simple, rapid and accurate method for the quantitative determination o ascorbic acid in potatoes and potato products has been developed. The system based on the reverse-phase, ion-pairing concept of high-performance liquid c romatography. Sample preparation is minimal and involves a one-step extracti followed by filtration and/or centrifugation. Recoveries were near the 100% level. As low as 0.02 meg ascorbic acid could be determined. AA

8 OORAIKUL (B) and MOLEDINA (KH). Physicochemical changes in potato granules during storage. *J. Food Sci.* 46(1); 1981; 110-2, 116

Changes in starch retrogradation (SR), water holding capacity (WHC), swelling power (SP), moisture content and rehydration rate of freeze-thaw (F-T) and add-back (A-B) potato granules during storage were investigated over a period of 100 weeks. In both types, SP decreased to minimum after 40 weeks and increased on further storage; WHC reached maximum after 52 weeks. Degree of SR increased after 40 weeks but decreased on further storage. There was also slight increase in moisture content during 32 weeks which declined on further storage. The above changes caused reduction in rehydration rate after 36 weeks of storage and then the rate increased. Similar changes appeared to occur by addition of Ca^{++} to granules during pre-cooking and cooling. MVG

69 KNORR (D). Functional properties of potato protein concentrates. *Food Sci. + Technol.* 13(6); 1980; 297-301

The influence of different protein coagulation procedures (HCl/heat treatment; HCl or $FeCl_3$ treatment at room temperature) and of different drying methods (freeze, spray, drumdrying) during processing of potato protein concentrates (PPC) on their functional properties was studied. All samples showed good foaming properties. Nitrogen solubility and gas absorption capacity were influenced by the methods of protein coagulation; water absorption and fat absorption capacities were influenced by coagulation and drying methods. Baking properties of PPC enriched breads such as specific loaf volume and relaxation were significantly affected by the method by which PPC was dried. AA

70 ZOBEL (M). Nutritional view points concerning the peeling of table potatoes in the GDR and on the international plane. *Ernahrungsforschung.* 24(3); 1979; 74-81 (German)

The large scale peeling of potatoes has been critically examined and preference is given to the use of alkali or steam rather than of mechanical methods of peeling. Precautions that must be taken when employing any of these processes have been mentioned. Cold storage of potatoes is absolutely necessary for several reasons. The model contract between peeling plants and consumers, which has been evolved in the District Court at Potsdam, should be adopted. KMD

SWEET POTATO

371 LOSH (JM), PHILLIPS (JA), AXELSON (JM) and SCHULMAN (RS). Sweet potato quality after baking. *J. Food Sci.* 46(1); 1981; 283-6, 290

Sweet potatoes baked at different temperatures (150, 180, 200 and 230 C) were evaluated for organoleptic quality, softness and content of sugar. Those baked at 200 and 230 C scored significantly for sweetness, mouthfeel, moistness, overall flavour and overall quality; they also contained greater amount of reducing sugar and were softer. Of the two varieties tested, painter roots scored significantly higher in quality than the other variety. There were positive correlations between reducing sugar concentration, resistance to pressure and sensory evaluation, while negative correlations were observed between moisture content and subjective measurements. MVG

COLOCASIA

2372 SHARMA (KK) and PATTABIRAMAN (TN). Natural plant enzyme inhibitors. Isolation and characterisation of two α-amylase inhibitors from *Colocasia antiquorum* tubers. *J. Sci. Food Agric.* 31(10); 1980; 981-91

The enzyme observed decreased gradually during the growth of the plant. The inhibitors inactivated human salivary, human pancreatic and hog pancreatic amylases, but they had no action on *B. subtilis* and *A. oryzae* amylases and also resisted attack by pepsin, trypsin, chymotrypsin and pronase. KAR

VEGETABLES

2373 WYATT (CJ). Comparison of sodium and sodium-potassium salt mixtures in processed vegetables. *J. Food Sci.* 46(1); 1981; 302-3

Green beans and corn were heat processed with different concentrations of a salt mixture as a sodium chloride (NaCl) substitute. The sodium (Na) and potassium (K) concentrations of the finished product were determined as well as the flavour desirability by an untrained panel. Certain levels of the salt mixture were judged not significantly different in desirability from the reference which contained 1.5% NaCl. The use of an equal mixture of NaCl and KCl was effective in improving the Na/K ratio. AA

LEAFY VEGETABLE

2374 HOLLEY (EM) and SISTRUNK (WA). Application of an improved experimental washer for leafy greens for canning. *J. Food Sci.* 46(1); 1981; 263-5, 271

A study was conducted to compare the quality of the effluent and canned spinach, turnip greens, and mustard when washed by experimental and industrial washing systems. Three 4-hour runs were conducted on spinach and one each on turnips and mustard greens. The effluent from the industrial washing system was significantly higher in total suspended solids, total solids, suspended solids, chemical oxygen demand, and nitrates than that from the experimental washer. Washing system has very little effect on quality of canned spinach. The major differences in quality were caused by cultivar and age of raw product. Total plate counts were not affected by washing system. AA

FRUITS

2375 NAIK-KURADE (AG). Marketing of processed fruits and vegetables in India. *Indian Food Packer.* 35(2); 1981; 112-9

The article covers aspects of fruits and vegetables like: size of the industry; cost of production, market structure, export market, local institutional markets, local consumer market, problems in marketing processed fruits and vegetables, product and packaging, prices and distribution, and short term and long term solutions, for the existing problems. BSN

BANANA

2376 GALEAZZI (MAM), SGARBIERI (VC) and CONSTANTINIDES (SM). Isolation, purification and physicochemical characterization of polyphenoloxidases (PPO) from a dwarf variety of banana (*Musa cavendishii*, L.). *J. Food Sci.* 46(1); 1981; 150-5

A method forisolating and purification of the enzyme from banana pulp is described. The purified enzyme (four isozymes) had a polypeptide molecular weight (SDS-gel) of 31000 ± 1000; on sucrose gradient ultracentrifugation, the molecular weight was 62000 ± 2000. The isoelectric point was 5.2 as determined by isoelectric focussing on polyacrylamide gel. The enzyme was stable at 55 C

for 30 minutes; it lost >90% activity after 5 minutes at 85 C and was completely inactivated at 95 C after 5 minutes. Purified enzyme had an absorption spectra of 278 nm (maximum) and a shoulder at 340-350 nm. Presence of fluorescent compound with Rf = 0.57 (identical with chlorogenic acid) in the enzyme was revealed by paper chromatography. MVG

2377 KOZUKUE (N). Determination of alpha-keto acids in banana pulp by high performance liquid chromatography. *J. Food Sci.* 46(1); 1981; 156-7; 160

By employing the method reported, it was found that ripe banana pulp contained (fresh weight basis) pyruvic acid (347 µg/100g), α-ketoglutaric acid (225 µg/100g) and oxaloacetic acid (13 µg/100g). The technique could be used to analyse α-ketoacids in biological samples. MVG

2378 ISSHIKI (K), TSUMURA (S) and WATANABE (T). High performance liquid chromatography of thiabendazole residues in banana and citrus fruits. *J. Assoc. Off. Anal. Chem.* 63(4); 1980; 747-9

A simple,high performance liquid chromatographic (HPLC) method for determining thiabendazole in fruits has been developed. Thiazadole is extracted with methanol and the extract is washed with n-hexane saturated with methanol. The determination is carried out by HPLC with fluorometric detection. LiChrosorb RP-8 is used as stationary phase and methanol-0.28% ammonia water (60+40) as mobile phase; α-methylindole is added as an internal standard. The limit of detection of this method is 0.1 µg thiabendazole/g. Recoveries are more than 92%. AA

MANGO

2379 ROE (B) and BRUEMMER (JH). Changes in pectic substances and enzymes during ripening and storage of "Keitt" mangoes. *J. Food Sci.* 46(1); 1981; 186-9

The relationship of the distribution of pectic substances to tissue softening was examined in ripening mangoes at four stages of ripeness. Water-soluble and alkali-soluble pectin declined and ammonium oxalate soluble pectin increased as the mango lost its firmness and became soft. Polygalacturonase and cellulase activities of cell wall preparations increased markedly during ripening. The decline in alkali-soluble pectin and the increase in polygalacturonase activity correlated well with the loss of firmness. Alkali-soluble pectin declined slowly in ripe mangoes stored at 4 C. This decline correlated with loss of firmness of the stored mangoes. The cellulase activity of cell wall preparations from ripe mangoes increased during 4 C storage and the increase correlated with the decrease in firmness. AA

APRICOT

2380 RODRIGUEZ (F), SECK (S) and CROUZET (J). The volatile components of apricots rouge du rouesillon. *Food Sci. + Technol.* 13(3); 1980; 152-5 (French)

PEAR

2381 HANKIN (L), LACY (GH) and MCINTYRE (JL). Organoleptic examination of pears from trees infused with oxytetracycline to remit symptoms of pear decline. *J. Food Prot.* 42(9); 1979; 732-4

One year after trees had been infused post-harvest with oxytetracycline (OTC) to remit symptoms of pear decline, pears were harvested and tasted. In four sessions, the panel of tasters discerned between pears from trees treated

with OTC and pears from untreated diseased trees. In three of the sessions, the fruit from treated trees was preferred over fruit from untreated diseased trees. AA

PAPAYA

2382 NATH (N) and RANGANNA (S). Determination of thermal process schedule for acidified papaya. *J. Food Sci.* 46(1); 1981; 201-6, 211

Studies carried out to evolve the minimum safe thermal process for canned acidified papaya based on enzyme inactivation are reported. For commercial canning, a 2.5 D process at pH 3.8 and 2.0 D process at pH 4.0 (equivalent to F values of 1.33 and 1.31 respectively) are recommended. Using these F values, process times for different processing conditions have been calculated by graphical method and compared with the values found by the three procedures of the formula method. MVG

2383 CHAN (HT) Jr., STEVEN (YTT) and SEO (ST). Papaya polygalacturonase and its role in thermally injured ripening fruit. *J. Food Sci.* 46(1); 1981; 190-1, 197

The polygalacturonase (E.C. 3.2.1.15) (PGase) activity in papayas increased with fruit ripeness. PGase activity was highest in the placenta with the activity decreasing outwardly from the placenta to the exocarp. Extended hot water treatments (46 C for 65 and 90 min.) caused delayed softening of the fruit tissue which was correlated to a decrease in PGase activity. The decrease in PGase activity after the heat treatments was more severe in the riper fruits (quarter and half ripe) than the less ripe fruits (colorbreak stage). AA

SUGAR, STARCH AND CONFECTIONERY

SUGAR

2384 FOLKES (DJ). A gas chromatographic method for the determination of pentosans. *J. Sci. Food Agric.* 31(10); 1980; 1011-6

A method for the determination of pentosans by gas chromatographic analysis of furfural produced by acid treatment is presented. Samples are treated with 3.85M hydrochloric acid and the furfural produced partitioned *in situ* into dibutyl ether. Furfural is measured by gas chromatography with acetophenone as internal standard. The method is calibrated against xylose which is taken through an identical hydrolysis procedure. When applied to starch and flour samples, the method showed good precision with a coefficient of variation 2-4% depending upon sample type. AA

2385 STEINLE (G), SCHALER (M) and BANAUCH (D). Specific enzymatic method for determination of D-xylose. *Z. Lebensmittel-Unters. Forsch.* 170(1); 1980; 7-10 (German)

A description of an enzymatic method for the specific determination of D-xylose is given. The method depends on the reaction of D-xylose with glucose-dehydrogenase. To avoid interference by glucose, glucosamine and mannose, these substances are phosphorylated with hexokinase/adenosinetriphosphate. The test procedure is performed by "Fixed time Kinetics". AA

2386 CARRO (O), HILLAIRE-MARCEL (C) and GAGNON (M). Detection of adulterated maple products by staple carbonisotope ratio. *J. Assoc. Off. Anal. Chem.* 63(4); 1980; 840-4

STARCH

2387 SRIVASTAVA (HC) and SRIVASTAVA (VK). Fluoro- and chlorodeoxy derivatives of starches. *Starch.* 31(8); 1979; 265-7

2388 KLAUSHOFER (Von H), BERGHOFER (E) and PIEBER (R). Quantitative determination of citric acid in citrate starches. *Starch.* 31(8); 1979; 259-61 (German)

Both colorimetric and titrimetric methods for determination of the esterlike bound citric acid in citrate starches are described. Both methods give comparable results. The titrimetric method is preferred because of its lower expenditure and rapid performance. AA

2389 SINNER (M), PULS (J) and DIETRICHS (H). Carbohydrate composition of nutshells and some other agricultural residues. *Starch.* 31(8); 1979; 267-9

Twelve lignocellulosic by-products of agriculture were analyzed for carbohydrates using acid hydrolysis followed by quantitative borate complex ion exchange chromatography. Hydrolysis residues represented 17% to 21% of the starting materials for corn cobs and cereal straws, and for nut and seed shells,23% (pistachio-nut) to 60% (Brazilnut). The carbohydrates in the hydrolysates were made up of 28% (peanut shells) to 52% (walnut, pistachionut shells) xylose, 39% (walnut shells) to 61% (cereal straws) glucose and in addition arabinose (0.1-6%), 4.0-methylglucuronic acid, galactose (1.3%) rhamnose (0.1-1%) and mannose (0-0.6%) were present. AA

CONFECTIONERY

2390 SCHREIBER (P). Various notes on confectionery products : a) Quality requirements for topgrade marzipan, b) Broken almond pralines (chocolates), c) The "Konfelet" mixture - an alternative to pralines, d) The market for chocolate articles, e) Current trends in the praline market. *Gordian.* 80(1-2); 1980; 6, 23-4, 25, 26 (German)

2391 KAMEL (BS) and BUENO (M). Determination of vitamin A and ß-carotene in Pizza by high speed liquid chromatography. *Food Sci. + Technol.* 13(3); 1980; 134-7

BAKERY PRODUCTS

BREAD

2392 DAFFERTSHOFER (G). Aroma producing substances of bread, and aromas for bread and fine-baked goods. *Gordian.* 80(1-2); 1980; 17-20 (German)

CAKE

2393 KUSHNER (L), ROSENZWEIG (WD) and STOTZKY (G). Effects of salts, sugars, and salt-sugar combinations on growth and sporulation of an isolate of *Eurotium rubrum* from pancake syrup. *J. Food Prot.* 42(9); 1979; 706-11

MILK AND DAIRY PRODUCTS

2394 MARSILI (RT), OSTAPENKO (H), SIMMONS (RE) and GREEN (DE). High performance liquid chromatographic determination of organic acids in dairy products. *J. Food Sci.* 46(1); 1981; 52-7

An aminex HPX-87 column at 65 C, 0.0090N H_2SO_4 mobile phase and UV detection at 220 and 275 nm were utilised in the simple isocratic HPLC method developed. The acids quantified for a variety of dairy products included orotic, citric, pyruvic, lactic, uric, formic, acetic, propionic, butyric and hippuric acids. With whole milk, recoveries were 90% for all acids except butyric for which it was 86%. MVG

2395 SWARTZEL (KR), HANSEN (AP) and McCLURE (WF). Relationship of absorbance to process treatments and flavour during storage of ultra-high-temperature dairy products. *J. Dairy Sci.* 63(7); 1980; 1039-42

Fluid dairy products (fat range 0.5 to 10.5%) were processed in an ultra-high-temperature steam injection system. Time-temperature relationships of processing included 138, 143 and 149 C for 20.3 s; 143 and 149 C for 6.9 s; and 149 C for 3.4 s. Product from each treatment was stored at 4, 24 and 40 C. Absorbancy readings were at 470 and 720 nm on subsamples at 4 weeks intervals for 60 weeks. Effects of light scattering were minimized by computing $\Delta A(A_{470}-A_{720})$. An increase in ΔA corresponded to change in slope of the spectrum between 470 and 720 nm, a change associated with discoloration (browning). All samples demonstrated an initial decrease in ΔA with an eventual increase over the storage period. Samples stored at 4 C decreased the most in ΔA with those at 40 C, the least. The eventual increase of ΔA occurred earlier and at a greater rate as storage temperature increased. With more severe heat treatments, the initial ΔA's were higher. From taste panel data compiled on the same samples at the same time intervals, an empirical relationship was formulated between ΔA, percent fat, taste panel evaluations, and storage time. A high correlation between taste panel ratings and ΔA readings was possible, suggesting an effective quality assurance test for stored ultra-high-temperature dairy products. AA

2396 STUBBLEFIELD (RD), VAN EGMOND (HP), PAULSCH (WE) and SCHULLER (PL). Determination and confirmation of identity of aflatoxin M_1 in dairy products: Collaborative study. *J. Assoc. Off. Anal. Chem.* 63(4); 1980; 907-21

An international collaborative study involving in collaborators was conducted to test methods, improved over previous methods with respect to speed and solvent use, for the rapid determination and thin layer chromatographic (TLC) confirmation of aflatoxin M_1 identity in dairy products. For the quantitative method, collaborators assayed samples of Gouda and cheddar cheeses, powdered milk, and butter containing levels of M_1 near the anticipated limit of determination. Statistical analysis of the study results indicated that the lower limit of determination and precision of this method were comparable to these parameters of methods previously approved for analysis for aflatoxin M_1. A few collaborators found that M_1 eluted early from cleanup columns with cheese and butter samples and that emulsions formed during powdered milk sample extraction. The reasons for these problems have been determined and remedies are provided. For the TLC confirmation of identity method, collaborators prepared triflouroacetic acid derivatives of M_1 on the plates after 2-dimensional development. Concentrations as low as 0.3 ng/g cheese and 1.0 ng/g powdered milk were determined in this study. As a result of this study, both methods have been adopted as official first action methods by the AOAC and as reference methods by IUPAC. AA

2397 FUKAYAMA (M), WINTERLIN (W) and HSIEH (DPH). Rapid method for analysis of aflatoxin M_1 in dairy products. *J. Assoc. Off. Anal. Chem.* 63(4); 1980; 927-30

Four methods for determining aflatoxin M_1 levels in fluid milk were compared in a search for asimple, routine analytical procedure. Each method was tested with samples spiked at levels of 0, 0.1, 0.5, and 1.0 ppb. The 3 quantitative methods were comparable in sensitivity (0.1 ng/mL) and recoveries (80-90%). A new method, using a commercially available extraction column that contains an inert hydrophilic matrix to permit extraction of dairy products, is described. The milk is adsorbed on the column and aflatoxin M_1 is eluted with chloroform-acetone (9+1). The extract is further purified on a small silica gel column and aflatoxin M_1 is determined by TLC. This method was simpler and shorter, and was equally sensitive and reproducible in determining aflatoxin M_1 in spiked and naturally contaminated fluid milk samples and in spiked nonfat powdered, condensed, and evaporated milk. AA

MILK

2398 HARWALKAR (VR) and KALAB (M). Milk gel structure. XI. Electron microscopy of glucono-Δ-lactone-induced skim milk gels. *J. Texture Stud.* 11(1); 1980; 35-49

2399 VAN VLIET (T) and WALSTRA (P). Relationship between viscosity and fat content of milk and cream. *J. Texture Stud.* 11(1); 1980; 65-8

A comparison of the published data on the flow behaviour of milk and cream at higher shear rates reveals conflicting results which can be explained partly by differences in experimental conditions. Among others, cold agglutination and churning effects appear to play a role. In the absence of these effects and at not very low shear rates, milk behaves as a Newtonian liquid. Excellent agreement is obtained between measured viscosity (η) as a function of fat content (ϕf) and theoretical relations between η and the volume fraction of dispersed particles, but only if the volume occupied by the protein particles and sugar molecules in the milk is taken into account. AA

2400 SHIPE (WR) and SENYK (GF). Performance specifications for measuring milkfat by turbidimetric means. *J. Assoc. Off. Anal. Chem.* 63(4); 1980; 713-5

Precision between duplicates of $\leq$0.03% for 0-5% and $\leq$0.04% for 5-8% fat is recommended regardless of type of milk. Maximum mean differences of $\leq$0.04% and standard deviations of difference of 0.10% for individual cow milk and 0.06% for bulk milks between instrumental values and standard chemical reference methods are specified. These recommendations are based on 95% confidence limits for 20 samples analyzed in triplicate. Sections 16.063-16.068 are revised to apply to all turbidimetric instruments regardless of model or manufacturer. A precaution section is included in the specifications to assure accurate instrumental performance. The specifications have been adopted as official first action. AA

2401 SHIPE (WF) and SENYK (GF). Evaluation of Milkotester Minor for determining fat in milk. *J. Assoc. Off. Anal. Chem.* 63(4); 1980; 716-9

The Milk-Tester Minor was tested to determine if it conformed to recommended AOAC performance specifications. Results were compared with those from the Babcock method and other approved instruments. Results indicated that the MT Minor conformed to the specifications for transfer errors, linear response, and homogenizer efficiency. In addition, 3 MT Minors, 1 Milko-Tester Automatic, 2 Model 300 Milk-Scans, and the Babcock method were used to determine 15 individual cow milks and 15 bulk milks in triplicate. Standard deviations of triplicates were 0.035 and 0.024 (av. for MT Minors), 0.015 and 0.013 (Automatic), 0.030 and 0.012 (av. for Milko-Scans), and 0.039 and 0.038% (Babcock) for individual and bulk milks, respectively. Standard deviations of differences between

instrument and Babcock results were within recommended limits with the 3 MT Minors, averaging 0.070 and 0.042% on individual and bulk milks, respectively. Analysts and MT Minors instrumental variations were studied by having 3 analysts operate each of 3 MT Minors independently to test 12 samples. Range of average fat content was 4.290-4.312% for analysts and 4.292-4.311% for instruments. AA

2402 PAAPE (MJ), SCHULTZE (WD), MILLER (RH) and SMITH (JW). Influence of exercise and stage of lactation on the milk somatic cell response of normal quarters to adrenocorticotrophin. *J. Food Prot.* 42(9); 1979; 719-23

2403 SHERMAN (P) and BENTON (M). Influence of skim milk powder/recodan RS ratio on the viscoelasticity of groundnut oil-in-water imitation milks. *J. Texture Stud.* 11(1); 1980; 1-13

Imitation milks were prepared with different ratios of skim milk powder (SMP) and Recodan RS(R) as emulsifiers while keeping their total concentration constant. The ratio employed influenced the viscoelastic properties of the milks, as derived from creep compliance-time studies, the electrophoretic mobility of the oil drops and the interfacial tension between the oil and aqueous phases. Optimum values of the viscoelastic parameters were obtained when the SMP/R ratio was between 4/1 and 8/1. Association occurs between the SMP and R under these conditions and stabilization of the flocculated oil drops is primarily by a steric mechanism. During storage of milks, the viscoelastic parameters initially increased due to continued growth of the flocculated oil drop structure but subsequently the parameters decreased as drop coalescence became the predominant factor. AA

2404 THOMPSON (JN), HATINA (G) and MAXWELL (WB). High performance liquid chromatographic determination of vitamin A in margarine, milk, partially skimmed milk, and skimmed milk. *J. Assoc. Off. Anal. Chem.* 63(4); 1980; 894-8

Saponification and subsequent evaporation of extracts can cause losses of vitamin A during analysis and thus cause erratic results. These steps were therefore, avoided by measuring retinyl palmitate and β-carotene directly in hexane extracts of milk and margarine. Extracts were purified before high performance liquid chromatography (HPLC) by washing with aqueous alcohol. Retinyl palmitate was measured at 325 nm after chromatography of LiChrosorb Si60, 5 μm, using ethyl ether-hexane (2+98) as the solvent system. Milk (2 mL) was shaken with absolute ethanol (5 mL) and hexane (5 mL). Water (3 mL) was added and, after mixing and centrifugation, 100 μL hexane layer was injected. Margarine (5 g) was dissolved in hexane (100 mL). After 5 mL of the hexane solution was washed with 60% ethanol and centrifuged, a 50 μL aliquot was injected. The results of the retinyl palmitate estimation in milk agreed with those obtained by a fluorometric method; the results in margarine agreed with those obtained by saponification, extraction, and HPLC. The coefficients of variation on analysis of 10 replicate samples of milk and margarine were 3 and 4.5%, respectively. The analysis of margarine for vitamin A was completed by measuring β-carotene with a detector set at 453 nm; the coefficient of variation of this measurement was 3% (10 replicates). AA

2405 WESLEY (JA), LANGLOIS (BE) and O'LEARY (J). Comparing three methods for counting rawmilk pour plates. *J. Food Prot.* 42(9); 1979; 729-31

2406 MURTHY (GK), MARTIN (R), RHEA (US) and PEELER (JT). Rapid colorimetric test for alkaline phosphatase in dairy products. *J. Food Prot.* 42(10); 1979; 794-9

2407 MURTHY (GK) and PEELER (JT). Collaborative study of rapid methods for alkaline phosphatase in milk and cream. *J. Food Prot.* 42(10); 1979; 800-3

2408 KUCHROO (CN), BALACHANDRAN (R) and GANGULI (NC). Comparative study on the proteins of humanized buffalo milk and infant foods. *Food Sci. + Technol.* 13(3); 1980; 115-7

Humanized buffalo milk (HBM), developed in the author's laboratory, was compared with four infant foods, based on buffalo milk, and marketed in India (MIF). The rate of proteolysis by trypsin was 1.5 times higher in HBM than in the market infant foods (MIF). All the MIF had a greater content of α-$\mathcal{L}$, β- and k-casein than HBM. The latter, however, had, as a major constituent, a protein component which was not found in any of the MIF. The proteins of buffalo skim milk and HBM were resolved into 3 or 4 fractions, under similar conditions, by chromatography on Sephadex G-100. The proportion of the high molecular weight:-fraction was very much less in HBM. KMD

2409 KLEYN (DH) and KLOSTERMEYER (H). Formation of dehydroalanine during heat treatment of β-casein. *Z. Lebensmittel-Unters. Forsch.* 170(1); 1980; 11-3 (German)

BUTTER

2410 WOO (AH) and LINDSAY (RC). Method for the routine quantitative gas chromatographic analysis of major free fatty acids in butter and cream. *J. Dairy Sci.* 63(7); 1980; 1058-64

A rapid quantitative method was developed for routine analysis of the major, even carbon-numbered free fatty acids in butter and cream. Free fatty acids were isolated directly from intact samples by a modified silicic acid-potassium hydroxide column and were separated by gas chromatography with a 1.8 m x 2 mm inner diameter glass column packed with 10% neopentyl glycol adipate on 80/100 Chromosorb W. Purified, formic acid-saturated carrier gas was required for minimal peak tailing and extended column life. The accuracy and reproducibility of the method was established through quantitative recovery studies of free fatty acid mixtures, free fatty acids added to butter, and replicate analysis of butter and cream samples. AA

2411 MIAN (MA), SHAH (BA) and KAMAL (S). Studies on standard chemical constants of buffalo ghee to ensure its purity. *Pak. J. Sci.* 32(1-2); 1980; 15-20

The standard chemical constants reported for pure buffalo ghee on the basis of the investigations are : acid value, 0.28-0.83, Saponification value, 224.54-238.82, iodine value, 28.35-36.25, Reichert Meissl value, 26.96-33.34 and polenski value 0.98-1.87. BSN

CHEESE

2412 DICKINSON (E) and GOULDING (IC). Yield behaviour of crumbly English cheeses in compression. *J. Texture Stud.* 11(1); 1980; 51-63

Compression measurements on samples of Cheddar, Cheshire and Leicester cheeses with an Instron Universal Testing Machine indicate the presence of a yield point characteristic of crumbly foods. The force and nominal strain at the yield point were studied as a function of deformation rate, temperature and preyield compression history. A recently proposed non-linear viscoelastic model with a single fracture element fits individual compression curves, but the model has little predictive capability. AA

2413 EMMONS (DB), KALAB (M) and LARMOND (E). Milk gel structure. X. Texture and microstructure in cheddar cheese made from whole milk and from homeogenized low-fat milk. *J. Texture Stud.* 11(1); 1980; 15-34

2414 JAO (YC), CHEN (AH), CHAUDHARI (RV) and GOLDSTEIN (WE). Rheology of enzyme modified cheese. *J. Food Sci.* 46(1); 1981; 254-8, 262

2415 KAUTTER (DA), LILLY (T) Jr., LYNT (RK) and SOLOMON (HM). Toxin production by *Clostridium botulinum* in shelf-stable pasteurized process cheese spreads. *J. Food Prot.* 42(10); 1979; 784-6

2416 TANAKA (N), GOEPFERT (JM), TRAISMAN (E) and HOFFBECK (WM). A challenge of pasteurized process cheese spread with *Clostridium botulinum* spores. *J. Food Prot.* 42(10); 1979; 787-9

2417 RUTZINSKI (JL), MARTH (EH) and OLSON (NF). Behaviour of enterobacter aerogenes and *Hafnia* species during themanufacture and ripening of camembert cheese. *J. Food Prot.* 42(10); 1979; 790-3

ICE CREAM

2418 COTTRELL (JIL), PASS (G) and PHILLIPS (GO). The effect of stabilisers on the viscosity of an ice cream mix. *J. Sci. Food Agric.* 31(10); 1980; 1066-70

The effect of locust bean gum, guar gum, sodium carboxymethylcellulose and carrageenan on the viscosity of an ice cream mix has been investigated over a range of shear rates. The effect of temperature on mix viscosity was also determined. The behaviour of the added polysaccharides was compared with their behaviour in other systems and carrageenan was found to show themost significant changes. The relative viscosity of mixes containing anionic polysaccharides increased with decreasing temperature; the relative viscosity of mixes containing neutral polysaccharides was independent of temperature. AA

MEAT AND POULTRY

2419 SKJOLDEBRAND (C) and OLSSON (H). Crust formation during frying of minced meat products. *Food Sci. + Technol.* 13(3); 1980; 148-51

When meat products are fried, the proteins are coagulated and the chemical and structural changes occurring at high temperatures lead to the formation of a brown crust on the surface. The authors have studied the time-temperature relationships in the crust. The thickness of the crust has been calculated, by using a histochemical staining method. There were indications that the Maillard, or similar reactions were taking place in the crust, but not in the inner parts of the loaf. This investigation is limited to frying in a convection oven. KMD

2420 HOFMANN (K) and SCHNEEGANS (H). Flaying-house in Schwallungen. *Fleisch.* 33(2) 1979; 29-32 (German)

Animal carcasses are processed in the flaying house. After obtaining the valuable products such as fat, feed, skin, fur and other by products, they are safely disposed of. Another important function of this flaying house is to protect the animals against the epidemic diseases. Disposing of the dead animals should be done in such a way that the environment is not affected. The old and new flaying houses have been described in this text with photographs. Finally the authors have hinted at the production of dog feed in the form of pellets. KMD

2421 EDWARDS (D). Slaughter facilities for tropical conditions : The selection and costing of appropriate systems. *Trop. Sci.* 22(1); 1980; 37-53

This article considers the design of four cost models for a range of small to medium-sized abattoirs suitable for conditions in tropical countries. A financial analysis of each of the four cost models is presented using factor costs pertinent to developing countries and the appropriate scale of slaughter fees to be charged is established. AA

2422 SCHARNER (E), FUHRER (G) and KUPEY (P). Problems of cleaning and disinfection in the meat industry. *Fleisch.* 33(2); 1979; 34-5 (German)

The importance of cleaning and disinfection measures for the production of good foods in the meat industry has been described. Various measures, cleaning agents and disinfectants are given in tables separately. KMD

2423 ULRICH (R), BOESE (F) and ZIMMERMANN (M). Aspects of the design of portioning, dosage and packing up of frozen, ready-to-serve meat-and-sauce dishes. Part I and II. *Fleisch.* 33; 1979; (2) 26-8; (3) 48,59; (10) 193-6 (German)

On the basis of the research work carried out at the Institute for Meat Industry of GDR, suggestions for a new process for the production of frozen, ready-to-serve, meat-and-sauce dishes have been given. More importance is attached to portioning, dosage and packing. The possible methods of processing to improve the output in this production range and the evaluation of the advantages and the disadvantages of the appropriate variants form the content of this text. Studies on variant 5 (separate packing of meat and sauce), ascertained the effect of freeze storing of vacuum packed, portioned meat without sauce on the quality of the products. KMD

2424 SOFOS (JN), BUSTA (FF) and ALLEN (CE). Botulism control by nitrite and sorbate in cured meats: A review. *J. Food Prot.* 42(9); 1979; 739-70

Nitrite plays a major role in keeping cured meat safe from *Clostridium botulinum* contamination. It retards the growth of the organism, and delays the production of its deadly neurotoxin. Residual nitrite and nitrosamine levels are minimal compared to total nitrate and nitrite ingested or formed in the human body. Sorbate, especially in combination with nitrite, at concentrations adequate only for cured meat colour and flavour development, is atleast as effective as currently used nitrite levels in delaying *C. botulinum* growth and toxin production. The mechanism of action of these chemicals remains to be discovered. KMD

2425 KAMAREI (AR), KAREL (M) and WIERBICKI (E). Colour stability of radappertized cured meat. *J. Food Sci.* 46(1); 1981; 37-40

Contrary to earlier reports, nitrate in irradiated cured meat did affect neither colour development nor post-irradiation fading. The post-irradiation bright red colour development in cured meats, like uncured ones, was due to reduction of globin myohemichromogen. MVG

2426 KHAN (HA), HARRISON (DL) and DAYTON (AD). Measuring skeletal muscle fiber width or diameter: Variance within and among methods. *J. Food Sci.* 43(1); 1981; 294-5

2427 STABURSVIK (E) and MARTENS (H). Thermal denaturation of proteins in post rigor tissue as studied by differential scanning calorimetry. *J. Sci. Food Agric.* 31(10); 1980; 1034-42

2428 GAULT (NFS) and LAWRIE (RA). Efficiency of protein extraction and recovery from meat industry by-products. *Meat Sci.* 4(3); 1980; 167-90

Data concerning the efficiency of protein extraction from meat waste tissues are presented. The tissues investigated were the lungs, stomach and small and large intestines of the ox, sheep and pig. Practically all of the protein, with the exception of connective tissue proteins, was solubilised under optimum extraction conditions both with alkali and anionic detergent. The disadvantages of isoelectric precipitation of alkaline extracted proteins have been investigated in detail using polyacrylamide gel electrophoresis incorporating sodium dodecyl sulphate (SDS). The compositions of the protein isolates from the various tissues studied differed from those of the soluble extracts and supernatants or wheys. However, a component of MW 75,000 daltons was characteristic of the wheys from each tissue. The compositions of both isolates and wheys are discussed in the light of structural and cytoplasmic proteins present in smooth muscle tissues. The usefulness of anionic polysaccharides as a means of whey protein recovery is discussed, together with similar benefits achieved using SDS. AA

2429 BOGAERTS (R), DE GROODT (JM) and De VOS (D). An ultra-sensitive microbiological method for the semi-quantitative detection of low-level sulfonamides. *J. Food Sci.* 46(1); 1981; 158-60

An improved agar-diffusion method has been developed for the detection of sulfonamides. The principle is based upon the incorporation of trimethorpim in Standard II-Nutrient Agar (pH 7.2) seeded with *Bacillus subtilis*. The sensitivity of *B. subtilis* to other antibiotics, including trimethoprim, is not influenced. This method is especially developed for the detection of sulfonamides in meat, but can be applied to pharmaceutical formulations, body fluids, etc. AA

2430 BAIER (A), URBAN (K-H) and WESTPHAL (F). Present status and future development of the processing of casings. *Fleisch.* 33(1); 1979; 14-7 (German)

On the basis of the studies made in the slaughtering plants, the present status of processing of sausage casings has been discussed. Various suggestions to improve the yield and the quality of animal intestines to be used as casings, have been given. They have been explained with the help of two schemes. KMD

2431 BAUMGARTNER (PA), KLETTNER (PG) and RODEL (W). The influence of temperature on some parameters for dry sausage during ripening. *Meat Sci.* 4(3); 1980; 191-201

There are several processing parameters which are important for the production of good quality dry sausage. One of these is ripening temperature. In this study ripening temperatures of 15, 20, 25 and 30 C for zervelat sausage in 60 mm calibre casings, and using starter culture, were compared by measurement of pH, firmness, water activity, water content and weight loss during a 28-day period. The results of the study showed that temperature of ripening directly influenced the rate of development of firmness and pH fall in the dry sausage. The velocity of ripening increased with ripening temperature so that a 5 Celsius degree increase in temperature approximately doubled the rate. The firmness increased as the pH dropped below 5.4. Water activity decreased continuously, the rate increasing as the ripening temperature was increased. Water content behaved similarly. At the lowest ripening temperature (15 C) the pH did not drop below 5.2. Higher ripening temperatures resulted in a slightly higher ultimate firmness of the dry sausage. AA

2432 HUFFMAN (DL), CROSS (HR), CAMPBELL (KJ) and CORDRAY (JC). Effect of salt and tripolyphosphate on acceptability of flaked and formed hamburger patties. *J. Food Sci.* 46(1); 1981; 34-6

BEEF

2433 BRADY (PL) and PENFIELD (MP). Textural characteristics of beef : Effects of the heating system. *J. Food Sci.* 46(1); 1981; 216-9

2434 TATUM (JD), SMITH (GC), BERRY (BW), MURPHEY (CE), WILLIAMS (FL) and CARPENTER (ZL). Carcass characteristics time on feed and cooked beef palatability attributes. *J. Anim. Sci.* 50(5); 1980; 833-40

2435 McKEITH (FK), SMITH (GC), SAVELL (JW), DUTSON (TR), CARPENTER (ZL) and HAMMONS (DR). Effects of certain electrical stimulation parameters on quality and palatability of beef. *J. Food Sci.* 46(1); 1981; 13-8

Effect of electrical stimulation (ES) at four stages in the slaughter-dressing sequence was studied. Effects of two voltages (150 vs 550 volts) and two impulse durations (1 vs 2 min) were also studied. Results indicate that ES improves palatability at any of the four stages. No differences between the two impulse durations were found. However, 550 volts improved lean maturity, lean colour, flavour, tenderness and overall palatability better than 150 volts. MVG

2436 CROSS (HR) and TENNET (I). Effect of electrical stimulation and postmortem boning time on sensory and cookery properties of ground beef. *J. Food Sci.* 46(1); 1981; 292-3, 295

Ground beef was prepared from electrically stimulated and nonstimulated sides of 24 U.S. Utility grade carcasses that were boned 1,3 or 24 hour postmortem. Postmortem electrical stimulation had no negative effects on the physical, sensory or cooking properties of ground beef patties. Time of boning had significant effects on percent height change during cooking, total cooking loss, tenderness, and juiceness. As boning time increased, the effects on the traits were negative. AA

2437 HARBERS (CAZ), HARRISON (DL) and KROPF (DH). Ascorbic acid effects on bovine muscle pigments in the presence of radiant energy. *J. Food Sci.* 46(1); 1981; 7-12

Raw Psoas major muscle, untreated and treated (dipped in ascorbic acid solution of 0,0.5, 1.0 or 5.0%) were exposed to radiant energy and the spectral reflectance measured every 30 minute. Between 0 and 4 hour exposure, ascorbic acid was found to retard pigment oxidation. The K/S ratio at 572/525 nm indicated that 5% ascorbic acid protected colour most. In muscle stored at -26 C, ascorbic acid retarded lipid oxidation between 3-10 week storage, with 5% solution giving the least protection. MVG

2438 PARRISH (FC) JR., SELVIG (CJ), CULLER (RD) and ZEECE (MG). CAF activity, calcium concentration and the 30,000-Dalton component of tough and tender bovine longissimus muscle. *J. Food Sci.* 46(1); 1981; 308-9, 311

2439 HONIKEL (KO), FISCHER (C), HAMID (A) and HAMM (R). Influence of postmortem changes in bovine muscle on the water-holding capacity of beef. Postmortem storage of muscle at 20 C. *J. Food Sci.* 46(1); 1981; 1-6

Salted (2% NaCl) and unsalted neck muscle homogenates were studied. At tissue pH of more than 5.9, salt caused a strong increase of water holding capacity (WHC). There was a small decrease of WHC during pre-rigor phase of both salted and unsalted muscles which was due to pH decrease brought on by rigor mortis. WHC of unsalted muscle was not influenced by rigor morits, but that of salted muscle suffered a strong decrease. The reason for this difference has been discussed. Decrease of pH was said to cause no more than 1/3 of the total postmortem WHC decrease, the other 2/3 being due to development of rigor. MVG

2440 HONIKEL (KO), HAMID (A), FISCHER (C) and HAMM (R). Influence of postmortem changes in bovine muscle on the water-holding capacity of beef. Postmortem storage of muscle at various temperatures between 0 and 30 C. *J. Food Sci.* 46(1); 1981; 23-5, 31

Salted and unsalted muscle homogenates incubated between 0-30 C were studied. The rate of pH fall was dependent on incubation temperature. It dropped fast at first and levelled off at 0.5 C; between 7 and 14 C there was an initial lag period of 2-3 hour; and at 30 C no lag phase was observed. At 0.5 C, postmortem metabolism was accompanied by cold shortening occuring before rigor and followed by little rigor shortening. Above 16 C there was an increase of rigor shortening without prerigor contraction. Water holding capacity (WHC) influenced neither shortening nor onset of rigor; the slight postmortem decrease in WHC was due to pH fall only. Salted homogenates prepared at different postmortem times also show a similar pH-WHC relationship above pH 6.0. However, at the onset of rigor 9 pH 5.9), the WHC decreases strongly in salted samples. Practical consequences of these findings are discussed. MVG

2441 ZIPRIN (YA), RHEE (KS), CARPENTER (ZL), HOSTETLER (RL), TERRELL (RN) and RHEE (KC). Glandless cottonseed, peanut and soy protein ingredients in ground beef patties: Effect on rancidity and other quality factors. *J. Food Sci.* 46(1); 1981; 58-61

Defatted oilseed proteins retarded oxidative rancidity development in cooked refrigerated samples; cottonseed protein showed the highest antioxidant potential. The extended patties showed higher cooked yield and less fat than all-beef patties and gave very similar sensory scores. MVG

2442 ABRAHAM (HC), MURPHEY (CE), CROSS (HR), SMITH (GC) and FRANKS (WJ) JR. Factors affecting beef carcass cutability: An evaluation of the USDA yield grades for beef. *J. Anim. Sci.* 50(5); 1980; 841-51

2443 LOCHNER (JV), KAUFFMAN (RG) and MARSH (BB). Early-postmortem cooling rate and beef tenderness. *Meat Sci.* 4(3); 1980; 227-41

Four distinct early-postmortem cooling rates (as measured within the longissimus muscle) were obtained by exposing one side of each of five fat and five lean steers to moving air at -2° and the other to 9° static air. Loin steaks of the fastest cooling group were found to be the least tender and to have the shortest sarcomeres; the three remaining groups differed significantly from each other in tenderness but not in sarcomere length. For all twenty sides, regardless of treatment group, tenderness was highly dependent on, and almost linearly related to, the muscle temperature attained at 2 hours post mortem (27-40°), the relationship deteriorating rapidly as longer time intervals and lower temperature ranges were considered. The results indicate that (1) except in very rapidly chilled lean carcasses, cold shortening is not a significant determinant of tenderness; (2) the enhanced tenderness of slowly chilled beef is not due primarily to the relatively prolonged avoidance of shortening-inducive temperatures but to the accompanying retardation of cooling during the first 2-4 hours post mortem, when muscle temperatures are still far above those associated with cold shortening and (3) the generally recognised superior tenderness of well finished beef is largely (and perhaps entirely) a consequence of slower cooling during this very early-postmortem period. AA

2444 TULSNER (M), PANNWITT (E) and SCHUBRING (R). Tests above hardening of beef by blending with table salt. *Fleisch.* 33(1); 1979; 18-9 (German)

Beef gels hardened when mixed with 8-10% table salt, as in the case of fish muscles. No changes in pH value or drying effects are noticed. The new structure is formed from the interaction of protein and table salt. Results showed that salt additions of around 8-10% are sufficient to form a new hardened structure. KMD

2445 BODRERO (KO), PEARSON (AM) and MAGEE (WT). Evaluation of the contribution of flavour volatiles of the aroma of beef by surface response methodology. *J. Food Sci.* 46(1); 1981; 26-31

Heterocyclic compounds containing oxygen, nitrogen and/or sulphur and unsaturated alcohols gave higher predicted scores and had lower optimum concentrations than ketones, aldehydes, alkanes and saturated alcohols. The hydrophilic compounds probably contributed more to meat aroma than hydrophobic compounds showing the more important role of water-soluble compounds in meat flavour. In mixtures, compounds of optimum concentrations were generally lower, but there was greater range in maximum scores. The two-component mixture (2-acetyl-3-methyl pyrazine and H_2S) gave the highest score. It was also shown that the mixture of H_2S and 4-hydroxy-5-methyl-3(2H)-furanone gave the highest predicted scores. The method, therefore, had immense potential in studying the complexity of the meat flavour system. MVG

2446 SCHROEDER (JW), CRAMER (DA), BOWLING (RA) and COOK (CW). Palatability, shelf-life and chemical differences between forage- and grain-finished beef. *J. Anim. Sci.* 50(5); 1980; 852-9

2447 GOKLAP (HY), OCKERMAN (HW), PLIMPTON (RF) and PENG (AC). Qualitative alteration of phospholipids in beef patties cooked after vacuum and nonpackaged, frozen storage. *J. Food Sci.* 46(1); 1981; 19-22

2448 BERRY (BW), RAY (EE) and STIFFLER (DM). Sensory scores and shear force values for beef roasts cooked either before or after chilling. *J. Food Sci.* 46(1); 1981; 231-3

2449 STERN (NJ). Isolation of potentially virulent *Yersinia enterocolitica* from variety meats. *J. Food Sci.* 46(1); 1981; 41-2, 51

It was found after examination of 63 samples of a variety of meats, that swine was likely to be a significant source of *Y. enterocolitica* which may get involved in human infections. MVG

2450 WILKINSON (SA), EARLE (MD) and CLELAND (AC). Kinetics of vitamin A degradation in beef liver puree on heat processing. *J. Food Sci.* 46(1); 1981; 32-3, 40

When heated at typical canning temperatures (103-127 C), the rate of vitamin A degradation followed first order kinetics. The activation energy for the temperature dependence of the rate constant was 112 ± 9kJ/mole. MVG

2451 KOH (TS), BENSON (TH) and JUDSON (GJ). Trace element analysis of bovine liver: Interlaboratory survey in Australia and New Zealand. *J. Assoc. Off. Anal. Chem.* 63(4); 1980; 809-13

SHEEP

2452 LEACH (TM), WARRINGTON (R) and WOTTON (SB). Use of a conditioned stimulus to study whether the initiation of electrical pre-slaughter stunning is painful. *Meat Sci.* 4(3); 1980; 203-8

In an attempt to determine whether electrical pre-slaughter stunning is painful, sheep were conditioned to expect stunning by exposure to a light for 5 sec. before the current was applied. Sheep in five groups received 90 V, 50 Hz, for 3, 6, 9, 12 and 15 sec, respectively. The heart rate, packed cell volume (PCV) and plasma glucose levels were used to assess the physiological response of the sheep to electrical stunning. After daily exposure to this regime for eleven days, the light stimulus was applied, but was not followed by stunning

The heart rate was not affected by the light. Both PCV and plasma glucose levels showed marked increases when stunning followed exposure to the light. Neither value rose on the twelfth day, when exposure to light was not followed by stunning. It is concluded that the initiation of electrical stunning was not a painful experience to the sheep in this experiment. No attempt was made to assess the depth or duration of insensibility following stunning. AA

2453 BHUSHAN (B), NINJOOR (V) and NADKARNI (GB). Effect of gamma-irradiation on lipid constituents of autolysing lamb liver. *J. Food Sci.* 46(1); 1981; 43-6

Irradiation (2.0 Mrad) resulted in five fold increase in TBA reacting substances. Losses in lipid constituents were only marginal. During autolysis, significant lipolytic activities persisted. This was indicated by decline in total phospholipid (50%) and levels of neutral fats along with a four-fold increase in fatty acid content. There was a rapid hydrolysis of vitamin A esters leading to enhanced vitamin A alcohol/ester ratios. Destruction of vitamin A was also compared between model systems, shark liver oil and lamb liver. It was found more in model systems. MVG

2454 DALGARNO (AC). The effect of low level exposure to dietary cadmium, on cadmium, zinc, copper and iron contents of selected tissues of growing lambs. *J. Sci. Food Agric.* 31(10); 1980; 1043-9

PORK

2455 DOMEL (G), HELLNER (F) and LEISTNER (W). Trends in ensuring good quality of pork and of the development of the losses of animals for slaughter. *Fleisch.* 33(5); 1979; 93-7 (German)

2456 OCKERMAN (HW), HOUBEN (JH), KROL (B), PLIMPTON (RF) Jr., and SCHAD (M). Effect of bone source and storage on the role of mechanically deboned pork in rancidity development in a cooked and smoked sausage. *J. Food Sci.* 46(1); 1981; 220-6

2457 SIELAFF (H) and GASTMANN (C). Determination of the tissue composition of pork carcasses by auxillary methods. *Fleisch.* 33(2); 1979; 37-9 (German)

There are methods of determining the tissue composition of the carcass of not only live, but also of slaughtered animals. Particular attention is given to the determination, by regression, of the tissue composition from the proportions of different tissues in a particular cut (or portion of meat). Thus, a separation of the various tissues from the whole carcass can be avoided, and it is still possible to determine the carcass value exactly. KMD

2458 KNIPER (CL), PLIMPTON (RF) and OCKERMAN (HW). Effect of tumbling and tumbling temperature on total aerobic plate counts (incubated at 25 C) and quality of boneless, cured hams. *J. Food Sci.* 46(1); 1981; 212-5

2459 TERLIZZI (FM), ACTON (JC) and SKELLEY (GC). Comparison of non-fermented and fermented hams formed with muscle strips, cubes and ground meat. *Food Sci. + Technol.* 13(3); 1980; 131-3

2460 BALDOCK (JD), FRANK (PR), GRAHAM (PP) and IVEY (FJ). Potassium sorbate as a fungistatic agent in country ham processing. *J. Food Prot.* 42(10); 1979; 780-3

2461 GORBATOV (VM) and LYASKOVSKAYA (Yu N). Review of the flavour-contributing volatiles and water-soluble nonvolatiles in pork meat and derived products. *Meat Sci.* 4(3); 1980; 209-25

In relation to the problem of meat flavour, volatile and minor non-volatile components of raw, cooked and pre-cured cooked pork meat (carbonyls, sulphur compounds, volatile fatty acids, alcohols and other volatiles, nucleotides and their decomposition products, free fatty acids) are considered. Quantitative changes in some of the components, as effected by technological treatments such as heating, curing and curing and heating, are compared. The possibility of evaluating the quality of heated cured pork products by the hydrogen sulphide/mercaptan ratio is indicated. AA

SWINE

2462 POWELL (SE) and ABERLE (ED). Effects of British weight on growth and carcass composition of swine. *J. Anim. Sci.* 50(5); 1980; 860-8

RABBIT

2463 OKITANI (A), OTSUKA (Y), KATAKAI (R), KONDO (Y) and KATO (H). Survey of rabbit skeletal muscle peptidases active at neutral pH regions. *J. Food Sci.* 46(1); 1981; 47-51

DEAE-cellulose chromatography of muscle extracts revealed five major activity peaks relating to a peptidase, aminotripeptidase, aminopeptidase, leucine aminopeptidase and the 160,000 Dalton-aminopeptidase. The last named enzyme was found most likely to have the largest part in tetrapeptide hydrolysis of the muscle at neutral pH. MVG

CHICKEN

2464 VAN DE BOVENKAMP (P) and KATAN (MB). Cholesterol content of chicken skin. *J. Food Sci.* 46(1); 1981; 291

In order to resolve conflicting reports on the cholesterol concentration in chicken skin, we have assayed cholesterol in skin by gas-liquid chromatography. The mean content for six chickens was 71 mg/100g raw skin. Thus the suggestion that chicken skin is particularly high in cholesterol is probably not correct AA

2465 LYON (BG) and KLOSE (AA). Effect of heat processing in cans and retort pouches on sensory properties of fowl meat. *J. Food Sci.* 46(1); 1981; 227-30

Results with sensory evaluation by trained panel indicated that the retort pouch process may offer a method for improvement of texture of processed meat from spent hens. Off-flavour development was related to precooking before retorting. MVG

2466 JONES (JM), GRIFFITHS (NM), GREY (TC), WILKINSON (CCL) and ROBINSON (D). The effect of polyphosphate salt injection on chicken breast muscle. *Food Sci. + Technol.* 13(3); 1980; 145-7

Breast meat from broiler chickens was injected with (a) polyphosphate, (b) sodium chloride, or (c) a mixture of the two. Injected carcasses lost more fluid during thawing and cooking; but they, nonetheless, gave a greater cooked yield and uninjected carcasses of comparable eviscerated weight. The meat from the injected carcasses was more tender, as measured by the tenderometer, and as judged by the sensory panel. Preference tests showed 43% of consumers preferred control meat, 48% preferred meat injected with the salts, while 9% had no preference. KMD

2467 HEOTIS (JP), MERTZ (JL), HERRETT (RJ), DIAZ (JR), VAN HART (DC) and OLIVARD (J). Specific programmed multiple development-thin layer chromatography of furazolidone in chicken, turkey, swine and bovine tissues: Collaborative study. *J. Assoc. Off. Anal. Chem.* 63(4); 1980; 720-6

EGG

2468 CHEN (TC). Observations on the weeping of double boiler scrambled egg products and its prevention. *J. Food Sci.* 46(1); 1981; 310-1

2469 TABER (L). Improved monomolecular fat film method for determination of yolk in egg albumen. *J. Assoc. Off. Anal. Chem.* 63(4); 1980; 939-40

The monomolecular film method can be simplified by an improved quantitation procedure. Following the extraction of the fat from the albumen and subsequent evaporation, the redissolved sample is applied to a round glass plate containing 1 in. pH 5 acetic acid solution topped by a film of oxidised oil sufficient to exhibit a colour of third order green. The sample aliquot is dropped from a 100 µl Hamilton syringe directly at the center of the oil surface. A circular pattern results. The diameter of the pattern is measured in centimeters with a ruler placed under the glass plate. The area of the pattern is then calculated by the formula for the area of a circle. AA

2470 TABER (LE). Study of vacuum oven drying in official method for moisture in eggs and egg products. *J. Assoc. Off. Anal. Chem.* 63(4); 1980; 941-2

Discrepancies occur when moisture or solids determinations on eggs and egg products are done by the vacuum oven method as opposed to the atmospheric oven method. The vacuum oven method requires a temperature of 100 C to a point of constant weight (about 5 h) at 25 mm of Hg. When compared with the same samples dried to constant weight in an atmospheric oven at 100 C the vacuum dried product will show a 10 to 50% greater loss of weight depending on carbohydrate content. The difference in the product colour from the 2 drying methods indicates a carbohydrate reaction in the vacuum dried product. AA

SEAFOODS

2471 DENG (JC). Effect of temperatures on fish alkaline protease, protein interaction and texture quality. *J. Food Sci.* 46(1); 1981; 62-5

Protein-protein interaction and enzyme hydrolysis affected texture of fish muscle heated at various temperatures. At 100 C, the predominant influencing factor was protein interaction. Between 55 and 85 C, protein interaction was the initial factor, but as the heating time increased it was masked by enzyme induced protein hydrolysis. At 35 to 45 C, the protein interaction was the main factor, while it was very slight at 35 C. At a later stage of heating at 45 C, influence of enzyme was barely detectable. MVG

2472 HUNG (SO), CHO (YO) and SLINGER (SJ). High performance liquid chromatographic determination of α-tocopherol in fish liver. *J. Assoc. Off. Anal. Chem.* 63(4); 1980; 889-93

A simple method is described for the determination of α-tocopherol in fish liver by high performance liquid chromatography. This method does not involve saponification or thin layer chromatography and thus avoids the destruction of α-tocopherol during sample preparation. The homogenized liver sample is extracted twice with dioxane-isooctane (20 + 80, v/v), and the combined extracts are dried under vacuum. The residue is extracted 3 times with acetonitrile from which α-tocopherol is then extracted with isooctane.

The residue from the dried isooctane solution is dissolved in methanol-water (90+10, v/v) which is injected directly onto a micro Bondapak C_{18} high performance liquid chromatography. The detection response to α-tocopherol at 280 nm was measured by peak height which was linear from 1 to 10 µg/25 µL injection. The coefficients of variation for retention time and peak height for 5 replicate analyses of the standard during 2 weeks were 1. 4 and 2.4%, respectively. Recovery of α-tocopherol added to the sample before homogenization was 80-92% with a mean of 86.2% and a coefficient of variation of 4.9%. The minimum amount of sample and the concentration of α-tocopherol that can be accurately determined by the method of 0.5 g liver and 1 µg α-tocopherol/g liver, respectively. AA

473 KORNER (W) and SCHREIBER (W). Shelflife of some Antarctic fishes during frozen storage. *Food Sci. + Technol.* 13(6); 1980; 326-9 (German)

Fillets from the Antarctic marble perch, the Antarctic gurnard, and the black hake were stored at -28 C in commercial style. Sensoric evaluations led to a shelflife of one year for fillets of the first two species and of one and a half years for fillets of black hake. Fillets of the Antarctic marble perch with their skin on could be stored too for up to one and a half years. AA

474 FAJARDO (LRDL) and MARTH (EH). Bacterial flora of fish from tropical sea water. *J. Food Prot.* 42(9); 1979; 724-8

475 De PAOLA (A). *Vibrio cholerae* in marine foods and environmental waters: A literature review. *J. Food Sci.* 46(1); 1981; 66-70

Seafoods have been implicated in a number of cholera outbreaks in the United States and abroad. The incidence of *Vibrio cholerae* in the environment may be attributed to its extended survival in seawater or to short- or long-term carriers. Strains of *V. cholerae* which do not agglutinate in O group 1 antiserum (NAG) have been associated with a number of gastroenteritis, septicemia, and meningoencephalitis cases in recent years, and genetic studies illustrate a close relationship between the deoxyribonucleic acid (DNA) of NAG and *V. cholerae*. The ability of NAGs to elicit responses in toxigenicity testing systems similar to those caused by *V. cholerae* has also been demonstrated. The incidence of NAGs and *V. cholerae* in U.S. coastal waters and seafoods, their survival, and the conditions that promote genetic changes and increase NAG virulence must be fully evaluated to determine the public health significance of these organisms. These studies are needed to reevaluate the effectiveness of the National Shellfish Sanitation Program (NSSP) growing area standards and criteria so that consumers may be protected against shellfish-associated vibrio diseases. AA

HERRING

476 JONER (PE) and UNDERDAL (B). Mutagenicity testing of irradiated herring fillets. *Food Sci. + Technol.* 13(6); 1980; 293-6

BOMBAY-DUCK

477 WARRIER (SB) and NINJOOR (V). Fish protein concentrate (FPC) from Bombay duck isolated by radiation-heat combination procedure: Functional and nutritional properties. *J. Food Sci.* 46(1); 1981; 234-8

The process described involves gamma-irradiation (200 Krad) and heat treatment (60 C. 10 minutes). Seventy five percent of proteins accounting for 80% of myofibrillar proteins were precipitated by the method. The FPC prepared by this method had a solubility of 3% in water and 15% in 5% NaCl. However, it could be hydrolysed by alkali (0.2 N NaOH) or proteolytic enzymes. Among the enzymes

tested, pronase was found to be the most effective solubilising enzyme. The product had good functional properties and had a PER better than that obtained for casein when fed to rats at 11% protein level. MVG

COD

2478 McLAY (R). Activities of cathepsins A and D in cod muscle. *J. Sci. Food Agric.* 31(10); 1980; 1050-4

Cathepsin A has been demonstrated in cod muscle. Cathepsins A and D were partially separated and purified from cod muscle. Cathepsin A and D are essentially similar to those from other sources. Cathepsin A acts optimally on the synthetic substrate CBZ-α-L-glutamyl-L-tyrosine at pH 5.0, whereas cathepsin D hydrolyses haemoglobin optimally at pH 3.8. Cathepsin D did not hydrolyse the synthetic peptides acted upon by cathepsins A, B or C. AA

2479 ITO (H), YODOSHI (M), TANAKA (J) and IWAIDA (M). Comparison of two methods and improvements for colorimetric determination of nitrite in cod roe. *J. Food Prot.* 42(9); 1979; 715-8

SHRIMP

2480 Van CLEEMPUT (O), DEBEVERE (J), DEBEVERE (P) and BAERT (L). Gamma irradiation of tropical shrimps. *Food Sci. + Technol.* 13(6); 1980; 322-3

The decontamination of shrimps handled in tropical areas has been studied using gamma irradiation. Deep frozen blocks were irradiated with doses upto 5 Kgy. It is found that up to 3 Kgy, there is a linear relationship between the number of microorganisms and the received dose, flattening out horizontally at higher doses. A dose of 5 Kgy is necessary to decrease the total aerobic bacteria by a factor of 3. After irradiation with 5 KGy, the remaining radiation resistant microflora consists partly of spores. It is also shown that gram positive bacteria are more radiation resistant than gram negative ones. The experiments on extension of shelflife show that with a dose of 5.0 KGy the shelflife at 6 C is extended from 4 to 8 days. Deterioration was determined by analysis for trimethylamine, ammonia and total volatile nitrogen. AA

PROTEIN FOODS

Nil

FRUIT JUICES AND BEVERAGES

2481 GUPTA (RM) and WARMA (SR). Protein hydrolysates : Applications in foods and beverages. *Bev. Food World.* 7(4); 1980; 31-3

FRUIT JUICE

2482 GHOSH (KG), NIRMALA (N), KRISHNAPPA (KG), PARAMESHWARAIAH (PM), BORKAR (H) and VIJAYARAGHAVAN (PK). Preservation of fruit juices and pulp in flexible pouches. *Indian Food Packer.* 35(2); 1981; 50-4

Preliminary investigations were carried out on different types of fruit

products (either pasteurized or preserved with SO_2 as indicated) ((i) mango pulp, (ii) mango pulp with 700 p.p.m. SO_2, (iii) mango syrup prepared from pulp preserved with 350 p.p.m. of SO_2, (iv) water melon juice and (v) pineapple juice (neat juice) packed in 300 gauge polypropylene pouches, stored at ambient (22-28 C) 5 C and 37 C. At 22-28 C, pasteurized (i) remained acceptable upto 3 months although colour deteriorated, which was also the case with storage at 5 C, while at 37 C, it was 2 months, (ii) and (iii), were acceptable upto 5 months under storage at 22-28 C and 5 C; pasteurized (v) was acceptable upto 3 week, although colour deteriorated at 22-28 C and 5 C. (iv) could be stored for 4 months at 22-28 C, but colour deteriorated. BSN

CITRUS

2483 ONO (M). Inhibitory effects of citric acid in enzymic debittering of citrus fruit juice. *J. Ferment. Technol.* 58(4); 1980; 387-9

Debittering of *natsudaidi* juice with rhamnosidase did not proceed so readily as hydrolysis of naringin at pH 2.8. In order to clarify the reason for this, this investigation was carried out, and the following results were obtained. i) Rhamnosidase was found to be markedly inhibited by citric acid, but not by other organic acids. ii) The inhibitory effect became more intense at lower pH values. iii) In order to remove effectively the naringin in the juice, selection of the amounts of rhamnosidase should take into consideration the concentration of citric acid besides naringin content and pH of the juice. AA

CASHEW APPLE

2484 CECCHI (HM) and RODRIGUEZ-AMAYA (DB). Carotenoid composition and vitamin A value of fresh and pasteurized cashew-apple (*Anacardium occidentale* L.) juice. *J. Food Sci.* 46(1); 1981; 147-9

All samples of red and yellow cashew-apples, fresh or pasturised juice, on study by column and thin-layer chromatography, visible absorption spectroscopy and specific chemical reactions, were found to contain alpha-carotene, β-carotene, ξ-carotene, cis-β-carotene, cryptoxanthin, aurochrome, cryptochrome and auroxanthin; β-carotene was the predominent pigment. Differences in colour indicated the total amount and not the type of carotenoid. There were no appreciable geographic effects on pigment composition. In processed juice, total carotenoid and vitamin A values were lower, but the epoxide level was higher. No quantitative differences among the different brands were noticed. MVG

TEA

2485 NAKAMURA (M) and KAWABATA (T). Effect of Japanese green tea on nitrosamine formation *in vitro*. *J. Food Sci.* 46(1); 1981; 306-7

The effect of Japanese green tea extract and various phenolic components of green tea on nitrosamine formation *in vitro* were investigated. We found that green tea extract seems to enhance the nitrosation of four secondary amines under acidic conditions; however, there exists an optimum concentration for the catalytic effect on nitrosamine formation. Among various polyphenols in Japanese green tea, only catechins catalyze nitrosamine formation, while pyrocatechol, pyrogallol, and gallic acid inhibit the reaction. No significant effect on the nitrosation reaction could be observed in the presence of either flavonols or flavones. AA

COFFEE

2486 ARJONA (JL), RIOS (GM) and GIBERT (H). Two new techniques for coffee quick roasting. *Food Sci. + Technol.* 13(6); 1980; 285-90 (French)

This article deals with two new fluidized bed techniques of coffee quick roasting. In the first method, an ordinary fluidized bed is used, whereas in the second, a fine inert material bed is employed. The mechanical behaviour of each of the two systems has been described. Each procedure gives rise to interesting results that are analyzed with regard to physical characteristics as well as to biochemical and organoleptic properties of roasted beans. KMD

COCOA

2487 MOHR (E). Analyses of raw materials: a) Tests on raw cocoa beans of the 1978/79 harvest, b) Tests on hazelnuts of the 1978/79 harvest. *Gordian.* 80(1-2); 1980; 6 (German)

2488 MERKEN (GV) and VAECK (SV). A study of the polymorphism of cocoa butter by means of DSC calorimetry. *Food Sci. + Technol.* 13(6); 1980; 314-7 (French)

The thermal analysis of cocoa butter by means of differential scanning calorimetry confirms the earlier findings of the existence of only four polymorphic forms of cocoa butter. The existence of a fifth form appears to be very unlikely, while a sixth form of high melting point, described by some authors must be regarded as a phase differing in composition rather than as a distinct polymorphic form. AA

MALTING

2489 SMITH (DB) and MORGAN (AG). Variation in the biochemical composition of acid extracts from barleys of contrasting malting quality. *J. Inst. Brew.* 86(6); 1980; 277-83

2490 BAXTER (ED) and O'FARRELL (DD). Effects of raised temperatures during steeping and germination on proteolysis during malting. *J. Inst. Brew.* 86(6); 1980; 291-5

2491 GOTHARD (PG), CLARK (NJ) and GORDON (AC). The effect of modification period upon the ability of a micro-malting procedure to select barleys for malting quality. *J. Inst. Brew.* 86(6); 1980; .299-301

WINE

2492 SCHREIER (P), DRAWERT (F) and ABRAHAM (KO). Identification and determination of volatile constituents in Burgundy *Pinot noir* wines. *Food Sci. + Technol.* 13(6); 1980; 318-21

Using standard controlled liquid-liquid extraction, adsorption chromatography on silica gel, and coupled gas chromatography mass spectrometry, the aroma composition of ten Burgundy *Pinot noir* wines from different vintages (1961-1976) was investigated. Quantitative gas chromatography was also carried out, and totally 65 volatile constituents were quantified. The aroma extracts possessed the characteristic flavour of Burgundy *Pinot noir* wines. However, none of the individual aroma components was responsible for the full body flavour of these wines. AA

BEER

2493 KOIVURINTA (J), JUNNILA (M) and KOIVISTOINEN (P). Functional properties of brewer's grain, brewer's yeast, and distiller's stillage in food systems. *Food Sci. + Technol.* 13(3); 1980; 118-22

The solubility, water and fat binding, and the emulsifying and foam stabilizing properties of brewer's grain dried on a conveyor or a drum drier, brewer's yeast dried on a drum-drier, and distiller's grain dried in a spray-drier or on a drum-drier were determined under different environmental conditions. The proteins of all three materials were highly denatured; the protein solublity of brewer's yeast was 20% approximately; of brewer's grain, less than 10%; and of distiller's stillage, 35% approximately, over a pH range of 3-8. Only brewer's yeast had a stabilizing effect on water-oil emulsions, the emulsion capacity being 12 ml/g. The foams obtained with brewer's yeast suspensions (15%) were almost comparable to whole egg foams, and they could be used in meringenes to replace up to 25% of egg white, on dry weight basis, without serious negative effects on the texture or the organoleptic properties of the products. KMD

2494 LILLY (V), BIRCH (M) and GARSCADDEN (B). The preservation of spent brewer's grains by the application of intermediate moisture food technology. *J. Sci. Food Agric.* 31(10); 1980; 1059-65

Investigation at laboratory-scale and pilot-scale showed that the wet grains could be stabilized by incorporating 30% of beet molasses and 0.3% of potassium sorbate into the grains after preliminary centrifugation. For effective preservation the stabilized grains should be consolidated in plastic bags, followed by closing to leave the minimum possible head space in the bags. KAR

2495 JAKOBSEN (M) and THRONE (RSW). Oxygen requirements of brewing strains of *Saccharomyces Uvarum (Carlsbergensis)* bottom fermentation yeast. *J. Inst. Brew.* 86(6); 1980; 284-7

2496 UJIKAWA (K) and BRAZZACH (ML). Calculation of wort compositions according to desired productivity and elementary compositions. *Biotechnol. Bioeng.* 22(6); 1980; 1271-2

2497 LATEGAN (PM), VAN VUUREN (HJJ) and ERASMUS (SC). The detection of *Enterobacter agglomerans (Erwinia herbicola)* in brewery worts by gas chromatography. *J. Inst. Brew.* 86(6); 1980; 288-90

2498 DREW (I) and WHITEAR (AL). Flavour stability studies : The use of fractional factorial designs. *J. Inst. Brew.* 86(6); 1980; 269-73

SPIRIT

2499 LEE (JSK) and FONG (LYY). Mutagenicity of Chinese alcoholic spirits. *Food Cosmet. Toxicol.* 17(6); 1979; 575-8

Mutagenic activity was detected in 17 of the 27 Chinese spirits but not in any of the imported drinks. The concentrates were shown to contain frameshift and/or base-pair substitution mutagens; some required metabolic activation and others did not. The data appeared to support various epidemiological studies suggesting that alcohol consumption might be an aetiological agent in cancer of the oesophagus. AA

WHISKY

2500 McDANIEL (MR) and SAWYER (FM). Descriptive analysis of whisky sour formulations: Magnitude estimation versus a 9-point category scale. *J. Food Sci.* 46(1); 1981; 178-81, 189

2501 QUINN (JP), BARKER (TW) and MARCHANT (R). Relationship between free and complexed forms of copper in malt whisky distillery spent wash. *J. Inst. Brew.* 86(6) 1980; 274-6

2502 McDANIEL (MR) and SAWYER (FM). Preference testing of whisky sour formulations: Magnitude estimation versus the 9-point hedonic. *J. Food Sci.* 46(1); 1981; 182-5

LIQUOR

2503 OTSUKA (K-I), SATO (K) and YAMASHITA (T). Structure of a precursor of β-methyl-γ-octa-lactone. An aging flavour compound of distilled liquors. *J. Ferment. Technol.* 58(4); 1980; 395-8

Deals with the structure of a precursor of MO-lactone identified as 2-methyl-3-(3,4-dihydroxy-5-methoxybenzo)-octanoic acid. KAR

OILS AND FATS

2504 SCHAICH (KM). Free radical initiation in proteins and amino acids by ionizing and ultraviolet radiations and lipid oxidation. Part I: Ionizing radiation. *CRC Crit. Rev. Food Sci. Nutr.* 13(2); 1980; 89-129

Discusses : ionizing radiations; basic processes and reactions; free radicals - production and effects; hydrated electron e^-_{aQ}; hydrogen atom; H, hydroxylradical; -OH, oxygen species; systems; reactions in amino acids; irradiation effects in peptides proteins; peptides; damage in proteins and specific observations. BSN

2505 SCHAICH (KM). Free radical initiation in proteins and amino acids by ionizing and ultraviolet radiations and lipid oxidation. Part II: Ultraviolet radiation and photolysis. *CRC Crit. Rev. Food Sci. Nutr.* 13(2); 1980; 131-59

Discusses : ultraviolet radiation and photolysis; basic processes and mechanism; aliphatic amino acids; sulfur amino acids; aromatic amino acids; proteins; specific damage in proteins; direct photolysis; and photosensitized oxidations. BSN

2506 CONACHER (HBS), CHADHA (RK) and LACROIX (G). Comparison of three sample preparation techniques for determination of organic bromide and chloride in halogenated lipids by X-ray fluorescence spectroscopy. *J. Assoc. Off. Anal. Chem.* 63(4); 1980; 709-12

2507 BASU (D). Biochemistry of lipid storage disorders. *Arogya.* 7(1); 1981; 28-37

SPICES AND CONDIMENTS

PICKLES

2508 GATES (K) and COSTILOW (RN). Factors influencing softening of salt-stock pickles in air-purged fermentations. *J. Food Sci.* 46(1); 1981; 274-7, 282

2509 COSTILOW (RN), GATES (K) and BEDFORD (CL). Air purging of commercial salt-stock pickle fermentations. *J. Food Sci.* 46(1); 1981; 278-82

OGIRI

2510 OGUNDANA (SK). The production of Ogiri, a Nigerian fermented soup condiments. *Food Sci. + Technol.* 13(6); 1980; 334-6

Origi is a Nigerian fermented soup condiment produced from water-melon seed (*Citrullus vulgaris* schrad). Although many fungi were isolated from the fermenting melon seeds, only *Absidia corymbifera* (cohn) Sacc and Trott and *Geotrichum candidum* link ex Pers. appear to be the microorganisms important in bringing about the fermentation. Sucrose, fructose and glucose were detected in the fermenting seeds on the first day of fermentation and only glucose was present on the second day. All the sugars disappeared finally on the third day. The microorganisms associated with the fermentation were shown to utilise the sugars in culture. AA

SPICE OIL

2511 GREEN (CL), GREEN (JHS) and ROBINSON (FV). Spice oils and oleoresins: Some technical considerations for prospective producers. *Trop. Sci.* 22(1); 1980; 27-35

Many spice-growing countries are now considering export-oriented production of spice oils and oleoresins-products which were until recently mainly manufactured in the major consuming countries of North America, Europe and Japan from imported spices. This paper describes a number of technical factors which may influence the success of any new venture and which require consideration by prospective processors. The advantages and disadvantages of processing in the spice-growing country; the importance of product quality; and the influence of cultivar selection, harvesting and preparation methods on the economics of processing and on product quality are discussed. AA

SENSORY EVALUATION

2512 MOSKOWITZ (HR). Relative importance of perceptual factors to consumer acceptance : Linear vs quadratic analysis. *J. Food Sci.* 46(1); 1981; 244-8

This paper introduces a new approach to evaluating the relative importance of sensory characteristics to acceptance, using quadratic relations. The analysis illustrates that the relative importance of any specific characteristic cannot be defined as a single number, but depends upon the level of that characteristic as perceived by the consumer, and upon the other sensory factors of the product. AA

2513 HERRMANN (J) and ABD El SALAM (I). Sensoric estimation of the partition coefficients and vapour pressures of flavour compounds with strong positive or negative deviations from Raoult's law in water-oil mixtures. *Food Sci. + Technol.* 13(3); 1980; 123-7 (German)

The intensity of an aroma depends primarily on the vapour pressure of the aroma-producing substance; which in its turn, is connected by Raoult's law, with the concentration of the substance in and aqueous or oily solution. By means of "subjective olfactometry" (SO), it is possible to establish the dependence of aroma intensity on (i) the vapour pressure which is estimated with an odorimeter, and (ii) on the concentration of the aroma producing substance in a solution held in odour beakers. Thus, SO is an inexpensive method of studying the dependence of vapour pressure on concentrations above the threshold of sensitivity and hence the dependence of concentration on the coefficients of distribution, and possibly also on positive and negative deviations from Raoult's law. These results can permit quantitative conclusions to be drawn about the flavour strength of a compound in an emulsion. Some equations have been derived theoretically and their accuracy tested by estimations of the vapour pressure of vanillin in water, salad oil or paraffin oil, or of propanol in water and salad oil. KMD

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

2514 DEBETS (FMH), STRIK (JJTWA) and OLIE (K). Effects of pentachlorophenol on rat liver changes induced by hexachlorobenzene, with special reference to porphyria and alterations in mixed function oxygenases. *Toxicology.* 15(3); 1980; 181-95

2515 OISHI (S) and HIRAGA (K). Testicular atrophy induced by phthalic acid monoesters: Effects of zinc and testosterone concentrations. *Toxicology.* 15(3); 1980; 197-202

2516 JENSEN (TL). Gas-liquid chromatographic determination of disulfoton in formulations: Collaborative study. *J. Assoc. Off. Anal. Chem.* 63(4); 1980; 869-72

2517 GRORUD (RB) and STEVENS (TS). Isomer specific assay of ester and salt formulations of 2-methyl-4-chlorophenoxyacetic acid and 2,4,5-trichlorophenoxyacetic acid by high pressure liquid chromatography: Collaborative study. *J. Assoc. Off. Ana. Chem.* 63(4); 1980; 873-8

2518 GIANG (PA) and JAFFE (H). Infrared spectrophotometric determination of encapsulated methoprene in poly (lactic acid) formulations. *J. Assoc. Off. Anal. Chem.* 63(4); 1980; 879-91

A simple infrared spectrophotometric method is described for determination of the percentage methoprene (isopropyl (E,E)-11-methoxy-3,7,11-trimethyl-2,4-dodecadienoate, Altosid, ZR-515) in a microcapsule sample of lactic acid polymer material. In the analysis, a weighed microcapsule sample was extracted with toluene-isopropanol in an Erlenmeyer flask, and the solvent mixture was evaporated in a rotary vacuum evaporator. For cleanup, the extract was dissolved in methanol and chromatographed through a column composed of sodium sulfate, silica gel, and aluminium oxide. The solvent was again completely evaporated, the

dried eluate was dissolved in an appropriate volume of carbon tetrachloride, and the infrared absorption was scanned. The response can then be related by a standard curve to mg methoprene/ml. AA

9 TESSARI (JD) and SAVAGE (EP). Gas-liquid chromatographic determination of organochlorine pesticides and polychlorinated biphenyls in human milk. *J. Assoc. Off. Anal. Chem.* 63(4); 1980; 736-41

A method for the detection of organochlorine pesticides and polychlorinated biphenyls (PCBs) in human milk is described. The method involves quantitative extraction of human milk with acetone and hexane. The pesticide and PCB residues are extracted from the milk fat with acetonitrile (ACN) and then partitioned back into hexane by aqueous dilution of the ACN extract. The ACN partitioning is followed by cleanup with Florisil column chromatography, eluting with 6 and 15% mixtures of ethyl ether-hexane. The 6% eluate is concentrated and transferred to a silicic acid column for separation of PCBs from pesticide residues. Compounds are quantitated by gas liquid chromatography. Recovery studies demonstrated that the procedure, provides 68-103% recovery for pesticides and PCBs. AA

20 IADEVAIA (R), AHARONSON (N) and WOOLSON (EA). Extraction and cleanup of soil arsenical residues for analysis by high pressure liquid chromatographic-graphite furnace atomic absorption. *J. Assoc. Off. Anal. Chem.* 63(4); 1980; 742-6

21 HUCKINS (JN), STALLING (DL) and PETTY (JD). Carbon-foam chromatographic separation of non-O, O-chlorine substituted PCBs from aroclor mixtures. *J. Assoc. Off. Anal. Chem.* 63(4); 1980; 750-5

22 SATYANARAYANA MURTHY (A), RAJABHUSHANAM (BR), CHRISTOPHER (K) and VENKATARAMANI (A). Improved ammonium molybdate method for thin layer chromatographic detection of organophosphate residues. *J. Assoc. Off. Anal. Chem.* 63(4); 1980; 756-7

An improved ammonium molybdate method for detecting organophosphate residues on thin layer chromatographic (TLC) plates is described. After development, the plates are heated at 110 C for 2 hour and the resultant inorganic phosphate is reacted with ammonium molybdate to form phosphomolybdate which is then reduced to a blue complex by ascorbic acid. Quantities as low as 0.1-0.2 µg residues could be detected on TLC plates by this method. AA

523 SHARMA (HC) and AGARWAL (RA). Environmental pollution due to pesticides industry and methods to reduce it in India. *Pesticides.* 14(10); 1980; 3-5, 28

Discusses pesticide production, usage and occupational health hazards. BSN

BIOCHEMISTRY AND NUTRITION

524 ANON. Concern regarding excessive consumption of salt. *Ernahrungsforschung.* 24(3); 1979; 92-3 (German)

525 GONDO (S), MORISHITA (M) and OSAKI (T). Improvement of glucose sensor performance with immobilized glucose oxidase-glucose isomerase system. *Biotechnol. Bioeng.* 22(6); 1980; 1287-91

526 UCHIYAMA (S) and UCHIYAMA (M). Properties of free radicals in protein and amino acid pyrolysates. *J. Food Sci.* 46(1); 1981; 113-6

The ESR intensities (g=2.0042 ~ 2.0053) of free radicals in L-lysine and casein pyrolysates increased with increase of the heating time. In L-lysine pyrolysate (200 C, 20 minutes), the fraction insoluble in organic solvents and water

accounted for 48.1% of the ESR intensity of the whole pyrolysate; the component responsible appeared to be a product of condensation polymerization, but the elemental analysis data indicated a smaller value for nitrogen than that expected for polylysine. The pyrolysis of casein brought about denatured products insoluble in water. The free radicals formed were stable for a week in distilled water and were unaffected by digestion with pepsin or pancreatin (37 C for 3 hour). AA

2527 TANAKA (A), HAGI (N), ITOH (N) and FUKUI (S). Application of immobilized lysine decarboxylase tubes for automated analysis of L-lysine. *J. Ferment. Technol.* 58(4); 1980; 391-4

2528 MAGA (JA). Measurement of available lysine using the guanidination reaction. *J. Food Sci.* 46(1); 1981; 132-4

Available lysine with its free ε-amino group can be chemically converted to homoarginine by means of a guanidination reaction using methylisourea (MIU). Various factors that can affect this reaction were investigated. For milk protein optimum conditions were found to be pH 10.8 for 96 hour at 20 C with a MIU concentration of 0.5M. Other protein sources had a different optimum pH for the guandination reaction. Addition of various carbohydrate sources and amounts did not interfere with the quantitation of available lysine. AA

2529 FRIEDMAN (M), ZAHNLEY (JC) and MASTERS (PM). Relationship between *in vitro* digestibility of casein and its content of lysinoalanine and D-amino acids. *J. Food Sci.* 46(1); 1981; 127-31, 34

Alkali and heat induce changes in proteins. These include recemization of L- to D-amino acids and crosslinking via lysinoalanine. Since high quality proteins are presumably well digested, possible effects of D-amino acid and lysinoalanine contents of food casein digestibility was examined. The following variables, which were expected to influence all three parameters, were evaluated: (a) pH (8-14); (b) temperature (25-75 C); and (c) time of treatment (10 minute to 24 hour). An approximately inverse relationship was observed between D-amino acid and lysinoalanine content and the extent of proteolysis. Such changes may lower the quality and safety of foods. AA

2530 FREIMUTH (U), NOTZOLD (H) and KRAUSE (W). On the alkali treatment of proteins. Part V. The formation of lysinoalanine in β-casein and β-lactoglobulin. *Nahrung.* 24(4/5); 1980; 351-7

2531 KARAYIANNIS (NI), MACGREGOR (JT) and BJELDANES (LF). Lysinoalanine formation in alkali-treated proteins and model peptides. *Food Cosmet. Toxicol.* 17(6); 1979; 585-90

2532 CHAVANA (S), HAQUE (A), NJAA (LA) and PETTERSEN (J). Methods for methionine and cysteine determination. A comparison between two institutes. *J. Sci. Food Agric.* 31(10); 1980; 1027-33

Methionine determined by gas-liquid chromatography and colorimetrically by iodoplatinate gave comparable results. For cysteine when 3 methods were compared, it was found that the best which can be obtained in a laboratory could be adopted after comparison. KAR

2533 SAROJ LARROYA, MOLLY GEORGE, SONI (GL), JETHI (RK) and RATTAN SINGH. Effect of megadoses of ascorbate with different dietary protein sources on lipid metabolism in guinea pigs fed on atherogenic diets. *Indian J. Exp. Biol.* 18(12); 1980; 1430-2

The hypocholesterolemic and hypolipidemic effects of ascorbate varied with the source of dietary protein. Ascorbate is more effective when combined with green gram dhal as the protein source, than when combined with casein or egg albumin. The green gram dhal itself was found to have hypocholesterolemic and hypolipidemic effects on the plasma, liver, and aorta of these guinea pigs fed on atherogenic diets. Thus, ascorbate therapy appears to have the best effect when coupled with pulses as the dietary protein sources. KMD

534 SPAHN (U), KNOLL (G) and PLENERT (W). Obesity in childhood. *Ernahrungsforschung.* 24(3); 1979; 89-91 (German)

TOXICOLOGY AND HYGIENE

535 KUJAWA (M), MACHOLZ (RM), PFAFF (K) and WOGGON (H). Effect of tin on rats. Part II. Comparison of the effects of tin (ii) chloride and tin incorporated into yeast. *Nahrung.* 24(4/5); 1980; 455-61 (German)

After application, of $SnCl_2$ and tin incorporated into baker's yeast, the effects on carbonic anhydrase (CA), glutathione peroxidase (GPx), lactate dehydrogenase (LDH), alkaline phosphatase (AP) and leucine amino peptidase (LAP) were measured. The tin contents of liver and kidney were determined. CA and GPx are not affected. AP and LAP are inhibited by high concentrations of tin (as $SnCl_2$). Tin incorporated into yeast exerts no effect. Inorganic tin produces increases in liver and kidneys. AA

2536 MASUDA (Y), KAGAWA (R), KUROKI (H), TOKUDOME (S) and KURATSUNE (M). Transfer of various polychlorinated biphenyls to the foetuses and offspring of mice. *Food Cosmet. Toxicol.* 17(6); 1979; 623-7

2537 PAIK JUNG (H-Y) and BJELDANES (LF). Effects of cadaverine on histamine transport and metabolism in isolated gut sections of the guinea-pig. *Food Cosmet. Toxicol.* 17(6); 1979; 629-32

2538 BARTNIK (FG) and WINGEN (F); Percutaneous absorption of dodecyltrimethylammonium bromide, a cationic surfactant, in the rat. *Food Cosmet. Toxicol.* 17(6); 1979; 633-7

2539 JAGOTA (SK), RAMANA RAO (MV) and DUTTA (SM). Beta-galactosidase of *Streptococcus cremoris* H. *J. Food Sci.* 46(1); 1981; 161-3

Beta-galactosidase (Beta-D-galactosidegalactohydrolase, EC 3.2.1.23) of *Streptococcus cremoris* H was partially purified by ammonium sulfate fractiona tion. Only 10% of the protein was recovered as enzyme protein and more than 50% of the enzyme in the crude extract was lost. A 2.6-fold purification only was achieved. The enzyme was most active at 65 C and recorded an optimum pH at 7.0. Km and V_{max} with ortho-nitrophenyl beta-D galactopyranoside as the substrate were recorded as 0.384 mM and 12.6 µmoles/mg protein/minute. Manganese ions activated the enzyme. The enzyme was strongly inhibited by Hg^{++}, Ca^{++}, Ni^{++} and Ag^{+} as well as parachloromercuribenzoate. AA

2540 SCOTT (VN) and TAYLOR (SL). Effect of nisin on the outgrowth of *Clostridium botulinum* spores. *J. Food Sci.* 46(1); 1981; 117-20, 126

Type A *C. botulinum* spores were the most resistant requiring 1000-2000 IU of nisin/ml for a 50% inhibition of TPYG agar plates. Type E spores were more sensitive and required only 50-100 IU/ml for 50% inhibition. Type B spores had intermediate sensitivity and required 500-1000 IU/ml for 50% inhibition. Similar

nisin requirements were observed for outgrowth prevention in TPYG broth and BHI broth over a 7-day incubation period. After prolonged incubation upto 65 days in TPYG broth, sporadic outgrowth was observed at higher levels with both A and B spores. In cooked medium, levels of 5000 IU/ml for type A spores and 2000 IU/ml for type B spores and Minnesota E spores were insufficient. For Beluga E spores a level of 2000 IU/ml was necessary. The binding of nisin by meat particles was traceable to higher nisin levels in cooked medium. MVG

2541 SCOTT (VN) and TAYLOR (SL). Temperature, pH and spore load effects on the ability of nisin to prevent the outgrowth of *Clostridium botulinum* spores. *J. Food Sci.* 46(1); 1981; 121-6

pH, temperature of heat-shocking, length of heat-shocking period and spore lo affected effectiveness of nisin with spores of types A, B and E in TPYG broth. At pH 6 (as compared to 7 or 8) and with heat damaged spores nisin was more effective Higher heat-shocking temperature (20-30 C) and larger period enabled lowering of nisin levels to inhibit spore outgrowth. Nisin was more effective against spore loads of 10^2 spore/ml than those of 10^3 or 10^4 spores/ml. The order of sensitivit of different spore strains tested were 56A < 69A < 113B = 213 B <Beluga E < Minnesota E. MVG

2542 GOLDNER (SB) and SOLBERG (M). Comparison of growth response by chemostat cultured and batch cultured *Clostridium perfringens* cells in various food substrates. *J. Food Sci.* 46(1); 1981; 138-42

Continuous culture growth of C. *perfringens* ATCC 3624 was monitored in a chemically defined medium and growth response was compared with batch cultured cells in a variety of substrates. The chemostat cultured cells can be used as an inoculum in protein quality assay as they reduced the time required for the assay to approximately 4 hour. MVG

2543 CURRAN (JM), SOLBERG (M), BLASCHEK (HP) and ROSEN (D). Casein inhibition of *Clostridium perfringens* growth and exoprotease production. *J. Food Sci.* 46(1); 1981; 169-73, 177

Growth of C. *perfringens* strain 3624 on a defined medium containing ANRC Reference Casein as the nitrogen source was investigated. Gas production, monitored manometrically as an index of growth, indicated a depressed growth response of the organism in the casein-containing medium. Increased growth response resulting from pepsin treatment of the casein was largely due to the enzyme serving as a nitrogen source. Chelation of iron by casein was not responsible for the growth inhibition. Casein suspended in complete medium was not inhibitory to the organism. Growth studies indicated that native casein was not available as a nitrogen source to the organism. Acid hydrolyzed casein and commercial casein hydrolysate served as suitable nitrogen sources for growth of the organism; however exoprotease production was repressed in both media as well as in medium containing native casein as the sole nitrogen source. C. *perfringens* strain 3624 produced exoprotease in the completely defined medium containing synthetic amino acids, indicating the possible presence of an amino acid or a metabolite, not produced in the casein-containing medium which functioned to derepress the enzyme synthesizing mechanism. AA

2544 MERCURI (AJ) and COX (NA). Coliforms and Enterobacteriaceae isolates from selected foods. *J. Food Prot.* 42(9); 1979; 712-4

2545 COX (NA), MERCURI (AJ), CARSON (MD) and TANNER (DA). Comparative study of Micro-ID, Minitek and conventional methods with Enterobacteriaceae freshly isolated from foods. *J. Food Prot.* 42(9); 1979; 735-8

Three laboratory technicians who independently recorded results of 6000 biochemical tests from each of the three systems were in complete agreement for 99.3%, 98.9% and 99.7% of the Micro-ID, Minitek, and conventional tests, respectively. Thus, the results obtained with the miniaturized systems were as easy to read and interpret as the conventional tests in tubes. The most frequently encountered Enterobacteriaceae from foods were *Escherichia coli* (broiler carcasses, pork sausages), *Enterobacter agglomerans* (carrots, lettuce, shrimp, strawberries), *Enterobacter cloacae* (pre-wrapped sandwiches) and *Serratia liquefaciens* (ground beef). KMD

2546 SVEUM (WH) and KRAFT (AA). Recovery of Salmonellae from foods using a combined enrichment technique. *J. Food Sci.* 46(1); 1981; 94-9

A single procedure was developed by combining the separate steps of pre-enrichment in lactose bath and selective enrichment in tetrathionate or selenite-cystine broths. The procedure saved assay time, labour and materials. MVG

2547 SHIVANANDA (PG), SARVAMANGALA (JN) and ACHYUTHA RAO (KN). Antigenic analysis of six species of candida by gel diffusion. *Arogya.* 7(1); 1981; 67-70

2548 ABDOLLAHI (A) and BUCHANAN (RL). Regulation of aflatoxin biosynthesis: Characterization of glucose as an apparent inducer of aflatoxin production. *J. Food Sci.* 46(1); 1981; 143-6

Aflatoxins were not produced when *A. parasiticus* was cultured on medium containing peptone plus mineral salts. Transferring the microorganism to a glucose-containing medium resulted in aflatoxin production. Initiation of aflatoxin synthesis could be blocked by treatment with cycloheximide or actinomycin D. It appears that glucose or a product of its metabolism, acting at the transcriptional level induces one or more of the enzymes responsible for aflatoxin synthesis. AA

2549 FILTENBORG (O) and FRISVAD (JC). A simple screening method for toxigenic moulds in pure cultures. *Food Sci. + Technol.* 13(3); 1980; 128-30

The production of aflatoxins B_1 and G_1 ochratoxin A, citrinin, patulin and penicillic acid has been detected in solid substrates by employing a method based on thin-layer chromatographic determination, without any prior extraction or purification procedures. A small agar-plug, from a pure mould culture, is used directly in the application of the sample on the TLC plate. The sensitivity of the method is estimated at 0.1-2.0 ppm, depending on the toxin. KMD

2550 HSIEH (DPH). Seminar on "Mycotoxins: Their biosynthesis in fungi". *J. Food Prot.* 42(10); 1979; 804-35

The following six papers were read at the seminar :
Bennet (JW) and Lee (LS). Aflatoxins and other bis-furanoids (p 805-9);
Gaucher (GM). Patulin and related carcinogenic lactones (p 810-4);
Huff (WE) and Hamilton (PB) : Ochratoxins-Metabolites of combined pathways (p 815-20);
Mirocha (CJ) and Pathre (SV). Zearalenone biosynthesis (p 821-4);
Ciegler (A) : Biosynthesis of the trichothecenes (p 825-8);
Robbers (JE). Ergot alkaloids (p 829-35). KMD

2551 INHAT (M) and THOMPSON (BK). Acid digestion, hydride, evolution atomic absorption spectrophotometric method for determining arsenic and selenium in foods. Part II. Assessment of collaborative study. *J. Assoc. Off. Anal. Chem.* 63(4); 1980; 814-39

Results obtained from the recent collaborative study of a hydride evolution atomic absorption spectrophotometric method for determining arsenic and selenium in foods have been studied intensively. Various parameters relating to the method have been considered; accuracy (excellent agreement between reference data and means over all laboratories for both model solutions and food samples; considerable bias for individual laboratories); precision within laboratory (repeatability coefficients of variation of 0.07-0.15) and among laboratories (reproducibility coefficients of variation of 0.13-0.28); frequency of outlying data from model solutions and biological samples (rejection rate from 9 to 29%); and detection limits (estimated as 80 and 120 ng/g for As and Se, respectively). Attempts were made to interrelate these parameters and to relate them to hydride generator characteristics and to other aspects of the procedure, namely, hydride generator type; absorbance-time peak width; standard curve slope, linearity, and precision; sample type; reagent blank magnitude; collaborator experience with sample treatment and hydride generation procedures, and departures from prescribed sample treatment procedure. On the basis of information from 28 laboratories using 16 different types of hydride generation apparatus, conducting 700 complete analyses and 2400 analyte quantitations on reagent blanks, 3 model solutions, and 13 different reference food samples with levels of As and Se ranging from 0 to 15,000 and o to 4,000 ng/g, respectively, the authors conclude that the method suffers from both systematic error and imprecision, and hence recommend that the method not be adopted. AA

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